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FAA Aviation News

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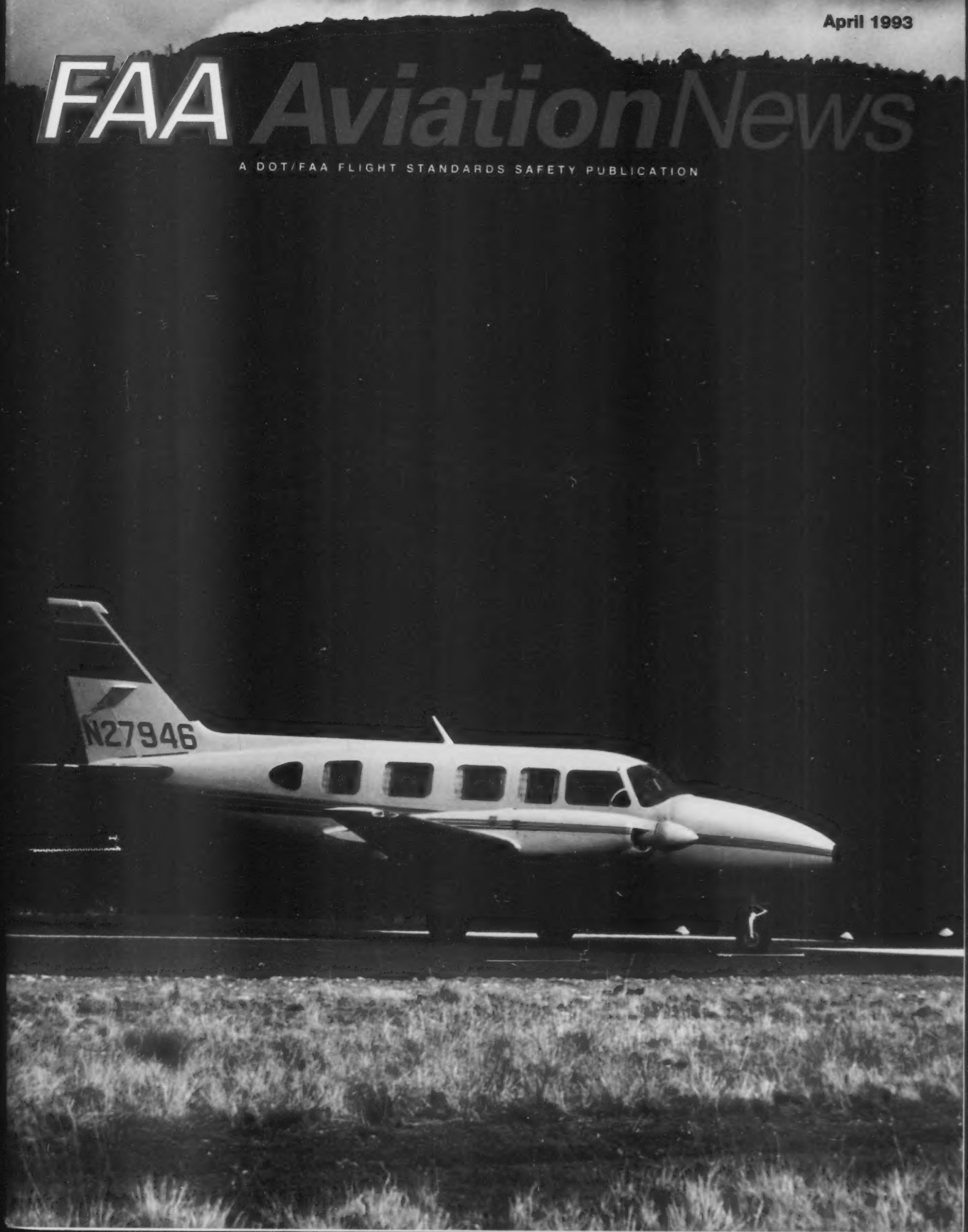

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Which type of fuel would you use in this aircraft?
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On the Back Cover:
Sun 'n Fun in Lakeland, FL, on April 17 through 24 is not the only aviation event around.
See page 28 for more details.

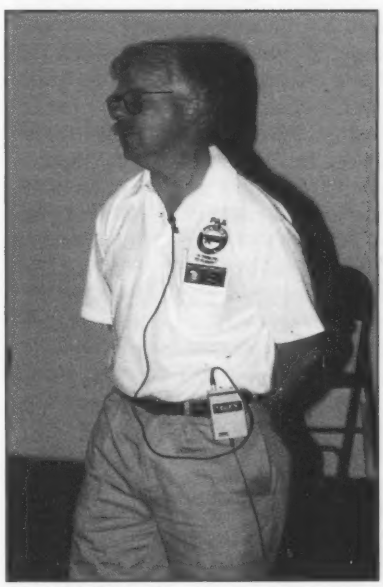
Doing the Right Thing

by Roger M. Baker, Jr., *Manager, National Accident Prevention Program Branch*

When I sat down to write this piece, I began to think about why we constantly strive to increase participation in the various events that we call the *National Accident Prevention Program.* I recalled a couple of examples I used in my "pep talks" to the ranks of the Accident Prevention Program Managers (APPM) around the country.

First, the FAA requires commercial aircraft to contain written checklists that the pilots must use. FAA then randomly conducts cockpit en route inspections (surveillance) to be certain that airline pilots use them. However, I like to think that all pilots follow their checklists for two far more important reasons: self-preservation and economy. "Failure to use checklist" has been cited as the cause of accidents and incidents which have resulted in fatalities, serious injuries, and economic losses. But this is no surprise to any of you; everyone knows that they should follow a checklist to keep any of the above from occurring. How do you know that? Throughout your flying career, whether for business or pleasure, you have seen and heard so much evidence—much of it from those safety seminars we send you yellow flyers about—that checklists are a good thing. Checklists have become a part of your everyday flying habits.

Second is the use of seatbelts in aircraft. No one asks anymore whether they should wear a seatbelt in either commercial or private aviation, but we still have some people who question the use in an automobile. Why? We wear seatbelts in aircraft (and use checklists) not because some regulation or inspector tells us to do so but because we have received and processed enough accident prevention information over the years that we know it is the right thing to do.



Roger M. Baker, Jr.

In the Accident Prevention Program in our own subtle way, we are trying to convince all of you to do the right thing when it comes to weather, fueling, crosswinds, instrument currency, recurrent training, and many other topics. Back in our aviation past we learned that there were good self-preservation and economic reasons for following the FAR and approved procedures. As time has passed we may have forgotten some of those reasons; however, it doesn't matter why we forgot them; what matters is that we take every opportunity to relearn those "right to do" reasons again. Wouldn't it be great if someday we had reduced the fuel exhaustion or "VFR into IMC" accident rate to zero? We can, you know, if we are constantly reminded of the things we already learned that would keep us from having such accidents. That is where the Accident Prevention Program comes in; that is our purpose, from FAA headquarters to the regional offices to the FSDO's.

The FAA has been supporting the Accident Prevention Program for over 30 years with the sponsorship and support of every segment of the aviation industry. Now more than ever in this time of budget shortfalls and belt-tightening, we must rely on government/industry partnerships to keep the Program going.

But, you say, you are not part of any big industry group; what can you do? *You* are the aviation industry, for without you there would be no reason for such an industry to exist. And you can lend a hand in the Accident Prevention Program. Perhaps you can give some

Continued on page 8

G. S. Livack

Flight Instructor Responsibilities

by Richard Perigo, *FAA Aviation Safety Inspector*

Mr. Perigo is the Accident Prevention Program Manager for the Wichita, Kansas Flight Standards District Office. This article comes from the October 1992 edition of his newsletter, "FSDO Flyer." Although the situations he describes come from his district, the idea of instructors fulfilling their safety responsibilities to students is universal. ***—Editor***

As an Accident Prevention Program Manager, I find that I get a very good picture of what is going well in the district and what is NOT going so well. Recently, I dealt with three situations that came under the heading of "not going so well." After reading them I hope you will agree with me that at the heart of the matter is *instructor responsibility.*

Situation Number One

Recently a CFI applicant arrived at the FSDO for his third attempt at obtaining his flight instructor certificate. Now, the third time is supposed to be the charm, but in this case it was not. He returned home with another addition to his already large collection of "pink slips." During a discussion between the examining inspector and the applicant's recommending instructor, the instructor made a statement something to the effect of, "Well, I didn't think he would pass, but I wanted to give him a shot at it." Wait a minute. That is not what a CFI is in business for—"to give him a shot at it"!!

Let's review what the regulations say about sign-offs for practical tests. First, look at the sign-off for the CFI ride. FAR § 61.187(a) says of the applicant that "his logbook must contain an endorsement by the person who has given him instruction certifying that he has found the applicant competent to pass a practical test. . . " The regulation then lists six subparagraphs detailing the subjects in which the applicant must be competent. Notice there is no reference to "giving him a shot at it."

Please understand that with the system WE (as in, WE are all in this together) use is one where the CFI trains the applicant, and the FAA spot checks that training with the practical test or checkride, as we call it. When the applicant walks through our door, we consider that applicant to be of CFI competence. All we are doing is making him or her legal to perform the duties of an instructor. The instructor making the applicant's sign-off has said to us, in effect, "This person is a competent flight instructor now—today. Please confirm my finding and issue the proper governmental paperwork so he or she can begin instructing."

This concept does not apply just to the CFI practical test. Please note FAR §§ 61.98, 61.107, and 61.127, which deal with recreational, private, and commercial applicants. Concerning CFI's making endorsements for applicants, the FAR say that the CFI shall certify that he or she "has found the applicant prepared to perform each of those operations competently" as a recreational, private, or commercial pilot. Notice in these endorsements that it does not even speak to the practical test but rather to the applicant's performing at the level of the certificate sought. Again, there is no wording about "giving him a shot at it." In the sign-off, you the CFI are saying that this pilot is competent as a pilot—whether recreational, private, or commercial. All you are asking the examiner to do is confirm your finding and do the paperwork to certificate the person.

Instructor responsibility, or lack thereof, is very apparent when the applicant fails a ride that the instructor expects him or her to fail. The real problem arises when that applicant slips by, and there is rejoicing back at the hangar because the applicant got lucky and passed. Think for a minute about what has just happened. A person, who a certificated flight instructor has concluded is at best questionable and at worst totally incompetent, has been certificated—certificated to share the airspace with you and me, to carry maybe my friends or his or her family in an airplane. In the case of a CFI practical test, that person has been certificated to teach other people how to fly—to share his or her incompetence with unsuspecting students.

This is why CFI responsibility goes to the very heart of aviation safety.

Situation Number Two

I recently had a conversation with a student pilot who had gotten lost as he "slipped the surly bonds of earth" over Kansas. It seems that he had carefully planned his solo cross-country route, plotting each line on the chart, marking off time-distance ticks, highlighting points of interest and things to avoid. He arrived at the airport with a chart that closely resembled a work of art. His regular instructor was on vacation at the time, and by previous arrangement, another very experienced CFI was to meet him and review his flight planning and sign him off in accordance with the FAR. During the review the instructor noticed that the student had plotted one leg of the course near a restricted area. The instructor advised that it would be better if the student gave that area a little wider berth. He recommended that the student separate that leg into two shorter legs by picking up a prominent road, follow that road to a rather large town, pick up an interstate highway at that town and follow the interstate, thus missing the restricted area by a very safe margin. The student agreed that this was the wisdom of Solomon and asked about replanning and replotting the flight on his chart. The instructor told the student something to the effect that since it was not a very large deviation and the road to be followed was very prominent it was not necessary to redraw all those lines on the chart and redo the calculations. All the student had to do was just follow the road.

As you can probably guess, the very prominent road to you or me proved not to be so prominent to the low-time student. The result was that the student found himself with no road to follow and no heading to fly. So, what's the point? Students are students because they lack the experience and skills. When they get the experience and skills, we call them pilots. What seems simple to the experienced instructor can seem like calculus to the student pilot. What is more, student pilots do not always step up and say, "Gee, I don't understand that." This is especially true when they are dealing with a new or unfamiliar instructor. But most importantly, there is a reason that we have students turn a perfectly good chart into something that looks like a cross between modern art and a flight log for the last moon shot. It ensures that the student understands and has available all that he or she needs to make the flight safely. The instructor is *responsible* for making sure that happens.

Do you think the student in this situation really "got himself lost?" It seems like he had some help.

Is the student really ready to go it alone? It is the flight instructor's responsibility to be sure.

Situation Number Three

Another lost student on his solo cross-country. This one was an "invader" from the east—Missouri, to be exact. Having evaded our eastern front defenses, he headed straight for his designated target airport. The only problem was he ran out of sectional chart about 40 miles out and began using—what his instructor said would be okay—a WAC chart. You know the WAC. It is the wallpaper of choice for at least one wall of almost every fixed base operator in America. Now, I realize that nowhere in the FAR can it be found that a student must use a sectional chart. Nor can it be found that a student cannot use a WAC chart. I guess the regs say nothing about using a Texaco road map either. (Come to think of it, I know a few folks who swear by them, but that's another story!)

Really, did the instructor fulfill his *responsibility* to the student when he said that a WAC would be okay? I know if you or I can get to within 40 miles of an airport and have a relatively good chart with us, we can find that airport. But, again, a student does not have the benefit of our experience. Remember, that's why we call them students. The CFI business—which, hopefully, is more a love than a business—is one of real responsibility.

But lest I close on a negative note, let me quickly add that in the last two situations, the students did exactly what they were supposed to do when they had trouble. They called and asked for help before they got into really bad trouble. There were no low-fuel situations, no airspace violations, and no near misses. The flight service people responded with the appropriate steer (DF rather Hereford or Angus), and the students were reoriented and on their way. Well done to the instructors who taught them to ask for help and how to ask for it. In that respect the instructors fulfilled their responsibilities to their students as they should have. ■

Aviation Sign Language

by Dean Chamberlain, *Associate Editor*

For those airmen who have not seen a recent copy of the FAA's *Airman's Information Manual* (AIM), the good news is that part of it is now printed in color. The better news is that some of the color illustrates the new standardized airport signs for both pilots and ground personnel. The best news is that you have plenty of time to learn about the new signs before they go into effect.

FAR Part 139 airports must have the new signs installed by January 1, 1994. (FAR Part 139 airports are those land airports that serve scheduled or nonscheduled air carrier passenger operations that use aircraft with more than 30 passenger seats.) However, some of these airports started installing the new signs last summer. Because of the possibility of this on-going installation process, flight and ground personnel may find a mixture of old and new styles of signs at some FAR Part 139 airports between now and the end of 1993. As part of the sign installation some airports will be redesignating taxiways. Therefore, it is particularly important to use the latest airport diagram and have the latest NOTAM's and ATIS information when taxiing.

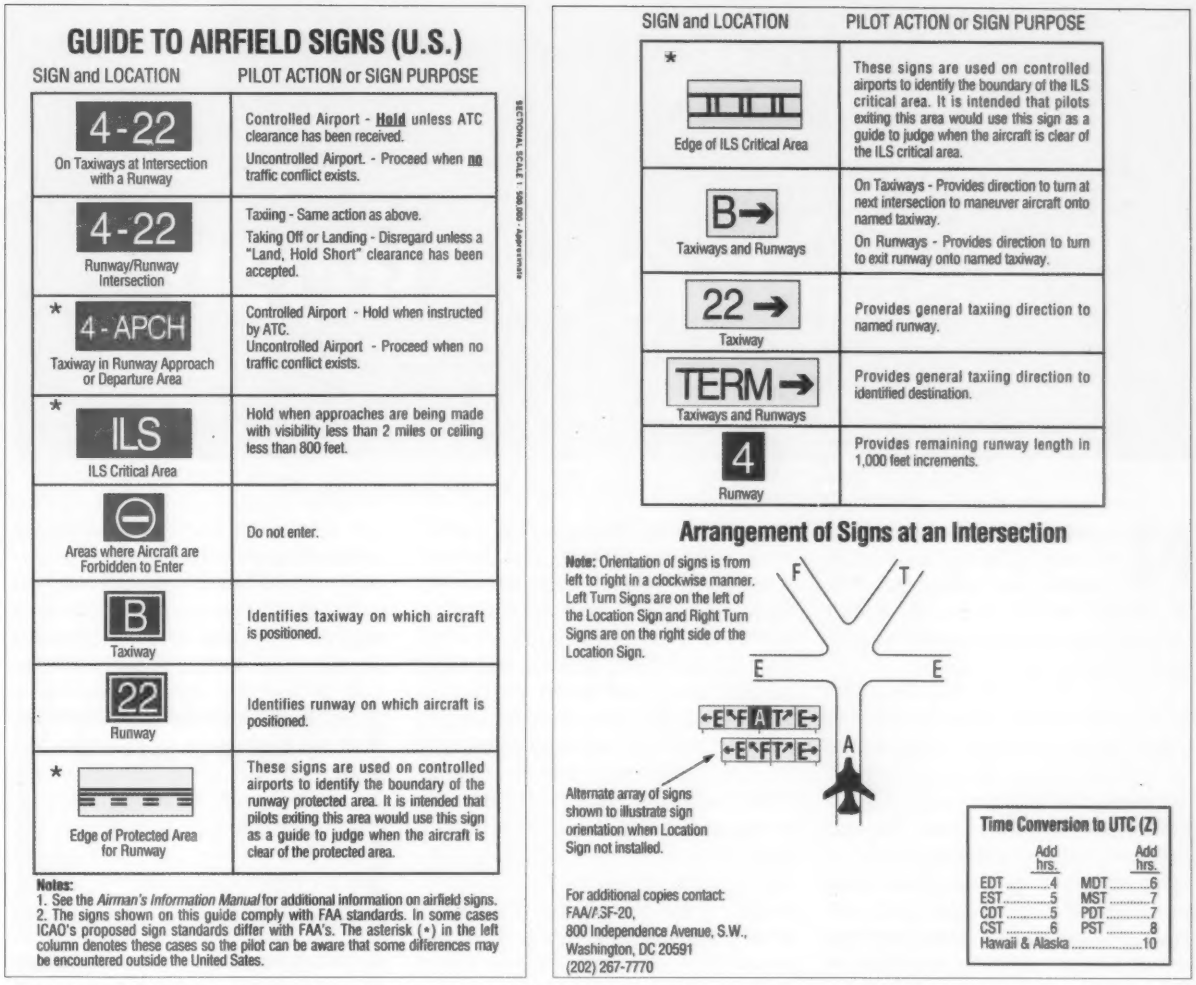
Although non-FAR Part 139 airports are not required to comply with the new sign format, many will probably install the new sign format as older signs are replaced. To accelerate the installation of signs at these airports the FAA is developing a standard for retroreflective signs. These signs will appear to be the same as the ones being installed on the FAR Part 139 airports, but will not be lighted. Several state aviation agencies have expressed interest in assisting in the installation of the new signs at these airports. However, it is conceivable that a combination of the old and new signs could exist for many years at non-FAR Part 139 airports.

The new signs are explained in both FAA Advisory Circular (AC) 150/5340–18 (Standards for Airport Sign Systems), and paragraph 2–23, (Airport Signs) of the AIM. Both the AC and the AIM include color examples of the five new types of signs. Ordering information is provided below.

The first new type provides MANDATORY information. These RED SIGNS with WHITE INSCRIPTIONS may mark a runway holding position or other critical operating area, or aircraft prohibited areas.

The second type shows LOCATION. The signs will identify the taxiway or runway on which your aircraft is located. The taxiway and runway signs have YELLOW INSCRIPTIONS on a BLACK BACKGROUND with a YELLOW BORDER. Two other location signs may be seen as you exit a runway or clear an ILS critical area. The runway boundary and ILS critical area boundary signs have BLACK INSCRIPTIONS depicting the pavement markings on YELLOW BACKGROUNDS. The runway boundary and ILS signs show you when you are clear of these areas. DIRECTIONAL signs are the third type. These YELLOW signs with BLACK INSCRIPTIONS use arrows to show the direction to various taxiways. If a sign contains more than one message, the messages are divided by a vertical message divider. Groups of signs are read from left to straight ahead to right. When a location sign is located in the array all signs for turns to the left will be located to the left of the location sign while signs for straight ahead or turns to the right will be to the right of the location sign. If it is just a simple intersection, i.e. one crossing taxiway, the location sign may be located to the left of the direction sign. Normally the direction signs will be located on the left side of the taxiway before an intersection. Runway exit signs will be located prior to and on the same side as the exit.

The fourth type of new sign shows direction to specific DESTINATIONS such as runways, terminals, FBO's, specific types of operating areas and other such locations. These YELLOW SIGNS with BLACK LEGENDS show direction several ways. An abbreviation (minimum of three letters) for the



GUIDE TO AIRFIELD SIGNS (U.S.)

SIGN and LOCATION	PILOT ACTION or SIGN PURPOSE
4-22 — On Taxiways at Intersection with a Runway	Controlled Airport - **Hold** unless ATC clearance has been received. Uncontrolled Airport. - Proceed when **no** traffic conflict exists.
4-22 — Runway/Runway Intersection	Taxing - Same action as above. Taking Off or Landing - Disregard unless a "Land, Hold Short" clearance has been accepted.
* 4-APCH — Taxiway in Runway Approach or Departure Area	Controlled Airport - Hold when instructed by ATC. Uncontrolled Airport - Proceed when no traffic conflict exists.
* ILS — ILS Critical Area	Hold when approaches are being made with visibility less than 2 miles or ceiling less than 800 feet.
Areas where Aircraft are Forbidden to Enter	Do not enter.
B — Taxiway	Identifies taxiway on which aircraft is positioned.
22 — Runway	Identifies runway on which aircraft is positioned.
* Edge of Protected Area for Runway	These signs are used on controlled airports to identify the boundary of the runway protected area. It is intended that pilots exiting this area would use this sign as a guide to judge when the aircraft is clear of the protected area.

Notes:
1. See the *Airman's Information Manual* for additional information on airfield signs.
2. The signs shown on this guide comply with FAA standards. In some cases ICAO's proposed sign standards differ with FAA's. The asterisk (*) in the left column denotes these cases so the pilot can be aware that some differences may be encountered outside the United Sates.

SECTIONAL SCALE 1:500,000 - Approximate

SIGN and LOCATION	PILOT ACTION or SIGN PURPOSE
* Edge of ILS Critical Area	These signs are used on controlled airports to identify the boundary of the ILS critical area. It is intended that pilots exiting this area would use this sign as a guide to judge when the aircraft is clear of the ILS critical area.
B→ — Taxiways and Runways	On Taxiways - Provides direction to turn at next intersection to maneuver aircraft onto named taxiway. On Runways - Provides direction to turn to exit runway onto named taxiway.
22→ — Taxiway	Provides general taxiing direction to named runway.
TERM→ — Taxiways and Runways	Provides general taxiing direction to identified destination.
4 — Runway	Provides remaining runway length in 1,000 feet increments.

Arrangement of Signs at an Intersection

Note: Orientation of signs is from left to right in a clockwise manner. Left Turn Signs are on the left of the Location Sign and Right Turn Signs are on the right side of the Location Sign.

F T E E ←E↖F A T↗E→ ←E↖F T↗E→ A

Alternate array of signs shown to illustrate sign orientation when Location Sign not installed.

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Time Conversion to UTC (Z)

	Add hrs.		Add hrs.
EDT	4	MDT	6
EST	5	MST	7
CDT	5	PDT	7
CST	6	PST	8
Hawaii & Alaska	10		

Although slightly larger than shown here, the "Guide to Airfield Signs" (U.S.) is available from your local APPM and is a handy reference for the new signage.

area with a directional arrow may be used. If two areas share the same direction such as two runways, the runway numbers will be separated by a dot. A directional arrow would then point in the common direction. If a sign shows separate routes for different locations, the information will be separated by a vertical black message divider line.

The last of the new standardized signs shows RUNWAY DISTANCE REMAINING. Although these signs are not required by FAR Part 139, many airports are installing them. The signs have a BLACK BACKGROUND with WHITE NUMERALS and may be installed on one or both sides of a runway. The signs indicate the remaining runway distance in thousands of feet with the last sign, showing the numeral 1, at least 950 feet from the end of the runway.

We have only shown a few of the new signage here. To make sure you are up on "the signs of the time," get a copy of the AC or AIM. A busy airport is no place to lose your way. ■

Copies of AC 150/5340–18 are available from Department of Transportation, M–484.1, Distribution Requirements Section, Washington, DC 20590. Copies of the AIM can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Telephone number (202) 783–3238. The AIM stock number is 750–001–00000–9.) Contact your local Accident Prevention Program Manager (APPM) to view a 25-minute videotape called "Aircraft Surface Movement—What every pilot should know about airport markings, lighting, and signs." You can also obtain copies of the reference card above called "Guide to Airfield Signs (U.S.)" from your APPM. And remember, at towered airports you can still ask ATC for progressive taxiing instructions. ***—Editor***

Misfueling of Aircraft

by Larry Craig, *Accident Prevention Program Manager, Lincoln, NE*

No, this is not a story about a new way to harvest corn in the midwest. Just about the time we thought we had pretty well solved the problem of misfueling aircraft, "Murphy's Law" strikes again.

The Piper PA 31–350 (*Navajo*) in the photograph had just taken off and was about a quarter of a mile off the end of the runway when both engines quit. Fortunately, the pilot was able to set it down in the cornfield. There were no injuries to the pilot or passengers.

Now, only two quick reasons come to mind when both engines on a piston-powered aircraft quit running: (1) no fuel, or (2) misfueled with jet fuel. In this case, the aircraft was misfueled with jet fuel. As I said, if there is a way for "Old Murph" to strike, he will, although in this case Old Murph had to work very hard to strike. So, how did the *Navajo* get fueled with jet fuel? It was not that easy, as you will see.

The story begins with the company that operated the *Navajo*. The company had previously owned a Piper PA–31T, a *Cheyenne*, with turbine engines that used jet fuel. Then the line person who normally fueled the *Cheyenne* quit the FBO. While this person was gone, the company sold the *Cheyenne* and bought the *Navajo* which was a piston-powered airplane that did not use jet fuel. However, the company had transferred the *Cheyenne*'s tail number to the *Navajo* and had painted the *Navajo* to look like the *Cheyenne*. Then the line person who used to fuel the *Cheyenne* returned to work for the FBO again. Soon after, the line person spotted a fuel ticket (You can see this coming, right?) with the *Cheyenne*'s old tail number on it, and fueled the *Navajo* with jet fuel. But this is only part of the story. Sometimes Old Murph really has to work at causing an accident. In this case the *Navajo* was equipped with jet-fuel-lockout devices and the jet-fuel truck was equipped with a flared jet-fuel nozzle. When FAA inspectors asked the line person how in the world was he able to get jet fuel in the *Navajo*, he replied, "Well, it took a long time."

The next question is, "Why didn't the pilot catch the misfueling during his preflight?" Obviously he did not. But then, how many of us would have checked for jet fuel during an early morning preflight, especially when the aircraft was equipped with jet-fuel-lockout devices. The question is how can similar misfueling accidents be prevented? Although, as this accident proves, there may be no absolute foolproof way of preventing an aircraft misfueling accident if Old Murph decides to intervene, the following ideas may reduce the risk of misfueling.

First, the FBO must ensure that line personnel are trained to recognize the different types of aircraft they may refuel and to know what type of fuel each requires. A rule should be made that if there is any doubt as to the proper type of fuel needed for an aircraft, the line person should wait and ask the pilot what type of fuel is required. Personnel writing up the fuel request must ensure that the proper type of fuel and desired quantity is listed correctly on the refueling order. Then the line person must ensure that clean, pure fuel of the correct type is put in the aircraft. Finally, the line person must accurately record both the type and quantity of fuel put in the aircraft on the refueling order.

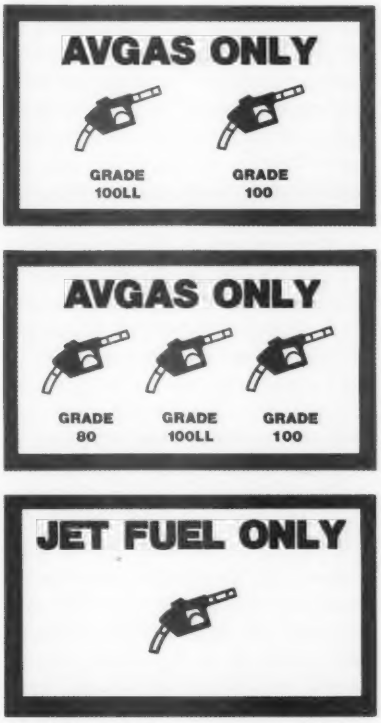
The pilot in command (PIC) has the ultimate responsibility of ensuring the proper fuel was used to refuel the aircraft. If possible, the PIC should watch the aircraft being refueled. If the pilot can not be present during refueling, the pilot should closely check the fuel receipt for the type of fuel put in the aircraft and, if possible, verify with the line department that the proper type of fuel was put in the aircraft. Then the pilot should do a careful preflight.

Each aircraft fuel-filler port should be marked with the proper type of fuel required. There are placards available to put around or near fuel ports that tell what type of fuel the aircraft uses. If there is any chance of the aircraft being confused with an aircraft that uses jet fuel, jet-fuel-lockout devices should be installed on the fuel ports, especially if the aircraft is marked as a "turbo" aircraft. Since some line personnel may think "turbo" in an aircraft

name means the aircraft is a turbine-powered aircraft that uses jet fuel, you might consider painting out the word "turbo" to avoid any possible confusion. But as this accident points out, even if the aircraft has jet-fuel-lockout devices and the jet-fuel truck has the proper jet-fuel nozzle, it is still possible for someone with the best of intentions to misfuel the aircraft. As this story points out, it was difficult but not impossible for the line person to misfuel the *Navajo*. So how do you prevent such an accident?

The PIC must check the tanks and sumps for fuel contamination during every preflight. Only by knowing the quantity, quality, and type of fuel on board can the PIC avoid a misfueling accident.

For additional information about how to avoid misfueling accidents, contact your local FAA Accident Prevention Program Manager at your local Flight Standards District Office. ■



Many aircraft display decals next to their fueling port to eliminate the question of which fuel to use. All the line person has to do is match the color and legend with the design on the fuel pumps and nozzles. (see examples above)

How to detect misfueling problems.

by Dean Chamberlain, *Associate Editor*

Misfueling accidents are preventable. The means are simple: Do not let someone put the wrong fuel in your aircraft. If they do, you must detect the misfueling before takeoff. But if this is so simple, why do pilots continue to takeoff with the wrong fuel on board? According to National Transportation Safety Board (NTSB) statistics of fuel related problems in small general aviation aircraft for a recent five-year period, 21 general aviation aircraft were involved in accidents in which NTSB listed improper fueling as a finding. Four of the accidents involved misfueling piston-powered aircraft with JET A fuel. Three of the four aircraft were Piper PA 31–350 *Navajos*. This statistic indicates that pilots flying *Navajos* should be particularly careful when refueling. Although NTSB did not list improper fueling as a probable cause in all 21 accidents, in some cases the cause could not be determined and in other cases the NTSB listed one or more of its other findings. The accident investigations also revealed a wide-range of fuel related problems. Automotive gasoline was mentioned in 12 of the accidents. In most of the cases, the autogas was being used without an STC. In one case, the pilot had been warned by his mechanic not to use autogas. In another case, the pilot operating handbook said not to use autogas. In addition to the problems of JET A misfueling and the use of autogas without a STC, the NTSB report's narrative summary listed other such fuel problems as water contamination, old fuel, ice, mixed fuels, borrowed fuel, and in one case, it reported a carburetor float absorbed enough autogas to malfunction.

So what can be done to prevent such accidents? How can new, and not so new pilots, avoid a fuel-related accident?

Since safety starts with the pilot in command (PIC), each pilot, especially renter pilots, must know what type of fuel or fuels his or her aircraft is approved to use. (The reason we said types of fuel is some aircraft may be approved for more than one grade of fuel in case the primary fuel is not available.) The aircraft's pilot operating handbook (POH), aircraft flight manual (AFM), or pilot operating manual lists what type or types of fuel are approved for use in the aircraft.

Some aircraft use automobile gasoline. They have a Supplemental Type Certificate (STC) approving the use of certain types of automotive gasoline. So it is important to know what types of fuel are used in a given aircraft, not only for your own benefit, but also for the person refueling the aircraft.

The Line Personnel

Like pilots, people refueling aircraft have varying levels of experience. As a result, you cannot be sure the person refueling your aircraft knows what type fuel you want or need in your aircraft. As PIC, you must ensure the person refueling your aircraft puts in the correct fuel. An interesting (and true) anecdote illustrates that safety is no accident. At an FBO the line person put avgas in a turbine-powered Beechcraft *King Air* because it had propellers. Fortunately, someone saw what was being done and stopped the fueling before any major damage was done. Later, that same line person had to refuel a World War II fighter. After having made one mistake involving a big "prop" plane, the line person did not want to make the same mistake twice, so he asked the pilot if he wanted jet fuel. The pilot thought the question was a big joke, so he said, "Yes." The line person filled the aircraft with Jet A. The moral of the story is not every new refueler knows what type of fuel every aircraft uses and if that conscientious person asks you what type of fuel you want, do not jokingly tell him or her to fill your aircraft with the wrong fuel. Like the pilot in

this example, you might get what you asked for. It could be a very expensive and even fatal joke on you.

The Preflight and the PIC

Preventing someone from putting the wrong type of fuel in your aircraft is only half of the battle against misfueling. The other half is not taking off with the wrong fuel on board. The only way to win the second half of the battle is for every PIC to do a "carefuel" preflight before every flight to check for the proper fuel.

The following are some "helpfuel" hints. First, as one petroleum industry bulletin says, "Aviation fuels should be 'clear and bright.'" Clear means being free of sediment or emulsion. Bright refers to the fluorescent appearance of fuel without any haze or cloudiness that could be caused by water droplets.

Color Test

Once a pilot has done an initial "clear and bright" check, the three common preflight fuel checks available to pilots are the color, smell, and feel tests. Avgas is color coded by octane grade: 80/87 red, 100 green, and 100LL blue. So the first avgas color test is looking for the correct color for the grade being used. Although color is an important test, the lack of color may be a more important color test. The explanation could be as simple as the approved use of autogas. If not, the lack of color could be mean mixed avgas grades. (If avgas grades have been mixed, check with your mechanic before flight.) Another more deadly explanation is that jet fuel, which is colorless or sometimes straw-colored, is in the aircraft. If jet fuel is on board, again check with your mechanic. Do not try to fly the aircraft. And according to one industry expert, a fuel sample that has been left out in the sun for a period of time can fade.

But in most cases, a colorless avgas sample probably only indicates the presence of aviation's most common fuel contaminate: water. If so, you should continue to take samples until you get a pure, color-coded fuel sample. If you have any doubts about having a good sample, check with your mechanic.

Smell Test

In addition to color, you can also do a "smell" test. Gasoline smells different from kerosene-based jet fuel, which has a very distinct smell. The best way to learn how to tell the difference is to smell pure samples of each.

Feel Test

Feel is the third common fuel test. Kerosene-based jet fuel has a more oily feel than gasoline. Again, the best way to develop a "feel" for the various fuels is to feel samples of each.

Paper Test

There is a "paper test" you can use to tell avgas from jet fuel. If you put a drop of avgas and a drop of jet fuel near it on a piece of clean, white paper, the gasoline will quickly evaporate and disappear. The oily and more slowly evaporating jet fuel will leave what can best be described as a halo spot on the paper as the fuel evaporates. Again, a test using pure samples is the best way to "see" how this test works.

You can learn more about fuel and fuel testing by going to your local FBO or instructor and talking with him or her about fuel. Another practical method is to buy some fuel samples from your FBO and experimenting. Try mixing various combinations of fuels and water to see how they look, smell, and feel. You should then be able to recognize a misfueling or water contamination problem if you ever have one. (If you do this at home or on the ramp, again observe proper disposal methods.)

For additional information on misfueling, you can contact your FAA Accident Prevention Program Manager (APPM) at your local Flight Standards District Office (FSDO)and ask to see a video entitled, "Basic Fuel Management." Remember accident prevention starts with a safe flight. And a safe flight starts with you. ***—Editor***

Doing the Right Thing

Continued from page 1

of your time (precious, we know) to assist in a program or convince your corporation to support a safety seminar or donate a meeting room. Maybe you can help another pilot relearn some basic airmanship. Maybe you can become an Accident Prevention Program Counsellor—a major commitment of your time and energy, but the rewards are high.

In 1992 the Accident Prevention Program participated in nearly 14,000 safety seminars and clinics which were attended by more than 880,000 people, a *63% increase over the attendance from the year before.* Our approximately 100 FAA personnel dedicated full time to the Accident Prevention Program didn't increase those numbers alone. Your colleagues in aviation volunteered at every opportunity to help. I and they would encourage each one of you to volunteer to help in your own way.

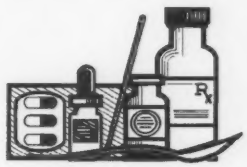
It's hard to measure our success, but we know that over the years we have been successful. The accident rates have declined over the past 10 years, and participation in the Accident Prevention Program has increased. We believe there is a direct correlation. And that correlation may have come from your attendance at a safety seminar; from your watching a safety video or slide/tape presentation; from your reading an Accident Prevention newsletter, safety pamphlet, *FAA Aviation News,* or just a clever safety sign; from your being counselled by a volunteer; from your dialing up an electronic bulletin board; or by your taking a tour of an air traffic facility—all brought to you in some way by the Accident Prevention Program.

We could all make aviation even safer if we would just pass the word to one other pilot to join us in participating in Accident Prevention Program Activities. Bring an airman friend to the next meeting and help him or her to remember "the right things to do."

See you at a seminar! ■

Our acknowledgement to film maker Spike Lee for the 1989 film "Do the Right Thing," which suggested this article's title. ***—Editor***

Medical Stuff



"White Coat Hypertension" Nearly Grounds an Aviator's Career

by Jeffrey L. Nelson

It all started the day I had my first elevated blood pressure reading during my annual Air Force physical. From that day forward, the nerve impulse in my brain triggered a nervous impulse in my stomach every time this event would show up on the schedule. No other requirement of my military career could prompt the sweaty-palmed, cold-sweat, gut-tumbling reaction that developed when I awoke on "P day" (physical day)—because suddenly the synaptic connection had been formed.

My career, my enjoyment, and, indeed, my paycheck relied on this one simple medical procedure. And unlike flying an aircraft, which I had no problem flying by the numbers, trying to keep my blood pressure within the required numbers while sitting in the doctor's office became a real challenge.

White coat hypertension had reared its head and by the second year it was getting me anxious.

The anxiety over this one event just kept festering inside me. I would rather face a no-notice checkride in a 40-knot crosswind than get my annual checkup. I would start thinking about the dreaded blood pressure cuff the day before, then the week before, and eventually weeks before the event. I could get nervous about my physical, and it wouldn't really have any effect on my vision or hearing or chest x-ray. But the free-flowing adrenaline could surely fire up the ol' blood pressure, and I knew it but remained unable to control it.

I would always pass my physicals, but not until a follow-up five day blood pressure check confirmed that my skyrocketing pressure on the day of my physical was not the norm. This was the real frustration—I was in my mid-twenties, a paragon of health, yet unable to control a bodily condition because my mind was overriding the event.

The situation has improved over the years, but I know a great many pilots who face this same malady once or twice a year as their medical expiration date rolls near. I think the impetus behind the problem is twofold.

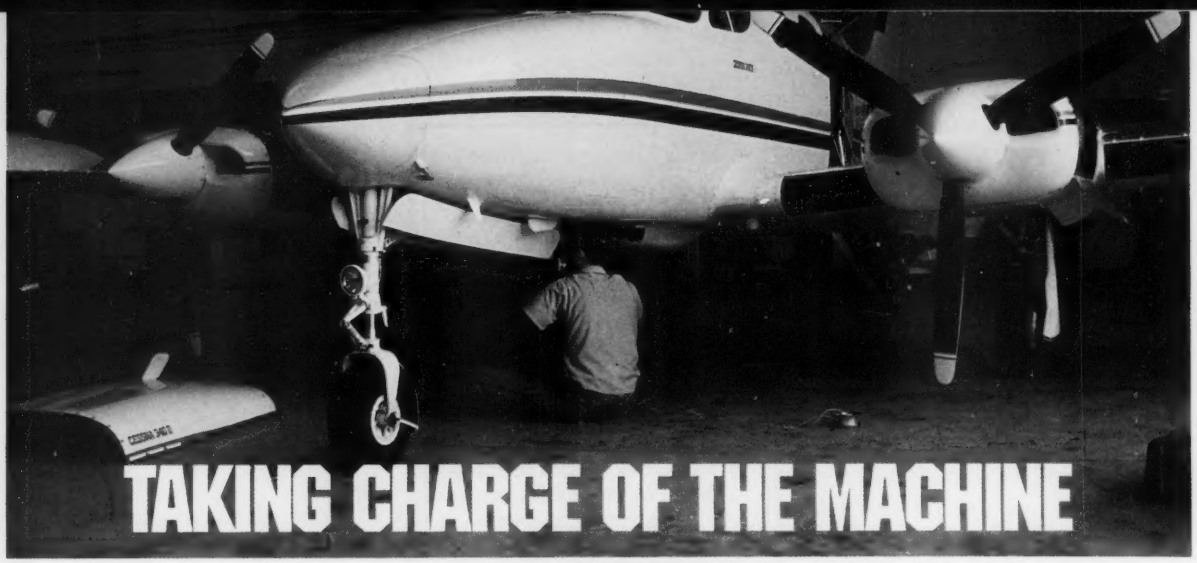
First, aviation is one of a few professions that requires medical certification in order to perform the job. Lose your medical and you lose your livelihood. That in itself creates a lot of pressure.

Second, pilots tend to be "controllers"—most pilot personality inventories reveal that pilots are strong-willed leaders who like to be in charge. They like to be in control of day-to-day situations, and that trait is denied when a pilot walks into the doctor's office. Now someone else is in control, not only of the event, but of the pilot's future as well.

I share this experience merely as a reminder for AME's. Any medical reading that does not fit into the established parameters should not be overlooked. There are factors that can cause an elevated blood pressure reading, and I'm not about to lecture to the professionals. But there is a factor that should be included in the list of excesses—i.e., salt, fat, and alcohol—and that is anxiety. It is easy to have an overabundance of anxiety when your career is on the line. I'm just thankful for the AME's who have the patience and understanding regarding this one day of hypertension a year.

There's an axiom for pilots who suffer from this syndrome—what goes up one day will probably come down the next, as long as they're not sitting in that darn doctor's office! ■

Any episode of elevated blood pressure should be monitored by your AME. Mr. Nelson is a commercial pilot who formerly flew with the airlines. He is the Editor of the aviation safety newsletter, The Airworthy Aviator, *which is published monthly by Aeromed Publications, 7900 Xerxes Ave. S., Suite 730, Minneapolis, MN 55431–1103. This article originally appeared in the Winter 1992 issue of* The Federal Air Surgeon's Medical Bulletin, *published by FAA's Civil Aeromedical Institute (CAMI).* ***—Editor***



TAKING CHARGE OF THE MACHINE

by Brian Jacobson

When it comes to responsibility for aircraft airworthiness, the buck stops with the pilot

Although many of us tend to regard our aircraft as living beings, they are, in truth, machines. They require regular maintenance like any other machine or piece of equipment. The FAR are quite explicit about how maintenance is to be performed and the time limits allowed for its completion.

The responsibility for assuring compliance with maintenance regulations rests on several shoulders. Traditionally, the *owner or operator* of an aircraft has the primary responsibility for maintaining his or her aircraft in an airworthy condition. The owner/operator must have the prescribed inspections completed, ensure that maintenance personnel make appropriate entries in records, and have any inoperative instrument or item of equipment repaired.

The *mechanic* making repairs or conducting an inspection must meet certain quality standards and must make required entries in the maintenance records of the aircraft before returning it to service.

Finally, FAR § 91.7 requires the *pilot in command* to determine whether the aircraft is airworthy before flying it.

If a particular airplane were never flown, it would not matter if it were in airworthy condition or not. However, once a pilot approaches that aircraft with the intention of flying it, that pilot must fulfill the requirements of FAR § 91.7, which states, in part, "The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight."

Therefore, while the FAR delegate airworthiness requirements to several parties, the ultimate responsibility for airworthiness rests squarely on the shoulders of the pilot in command. Unfortunately, not all pilots meet that responsibility. For example, I recently asked a pilot why he did not do a preflight when he came to pick up his aircraft after an annual inspection. He said it was not necessary because the mechanic who completed the inspection was better qualified than he is, and he expected that there was nothing wrong with the airplane. It never occurred to him that the mechanic who had worked on the machine may have made a mistake somewhere along the line.

Last Resort

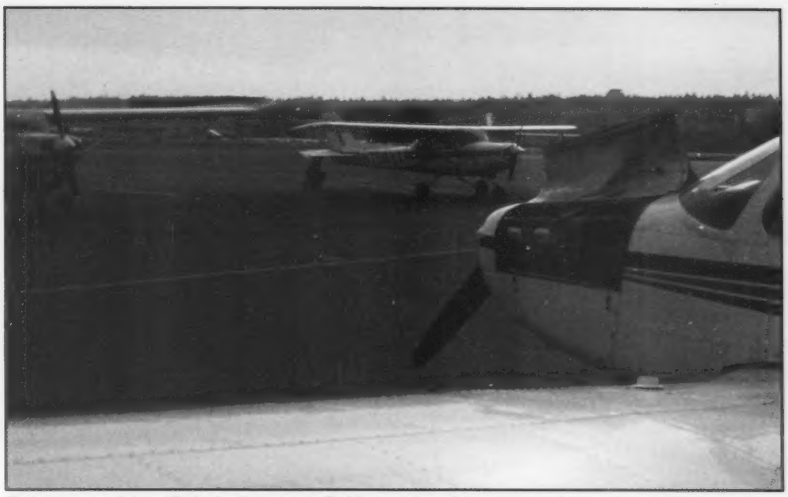
The accident files show that mechanical malfunctions immediately after scheduled or unscheduled maintenance do occur more often than we would like to believe. A friend of mine was able to preclude such an occurrence by doing a thorough preflight after an annual inspection. She discovered that the mechanic had not replaced the oil in the engine. Had her preflight been hasty or nonexistent, the engine would have seized shortly after she applied full power. She was rightfully upset and let the mechanic know it. Her own inspection saved her from experiencing a very dangerous situation. Another friend was not so fortunate. She had a complete electrical failure at night after maintenance was done on her aircraft's alternator. Several years ago, I ferried a Cessna 150 to a mechanic for a pre-purchase inspection. When the cowling was removed, we found a half-inch-drive ratchet resting on top of the engine. There are other stories of mechanics not safety-wiring oil plugs, leaving cotter pins out of wheel nuts, leaving jack pads attached to the aircraft, tying cable bundles to a vacuum line, thereby constricting the line, and rigging ailerons backwards after a cable change.

Your mechanic is not infallible. He or she is human and can make mistakes, too.

With this in mind, I always ask the mechanic to accompany me during a preflight after maintenance. If I should spot something that does not look right, the mechanic can explain the apparent anomaly or make repairs.

Sometimes, the mechanic finds something missed earlier, before I see it.

Even if there is nothing to be found, having the mechanic accompany you on the preflight inspection will enable you to learn more about your aircraft. My experience has been that mechanics enjoy the opportunity to explain the workings of airplanes and their systems to customers.



Doing a careful preflight before each flight could avoid some unpleasant surprises once you get into the air.

Check the Records

Before flying an aircraft you are unfamiliar with, assure yourself that the required maintenance is complete and up to date. Last summer, while pursuing a purchase of a Cessna 172, I ran across two airplanes that had not been inspected within the last 12 months. Neither owner told me his airplane was not airworthy, and both had flown their airplanes recently. One of the airplanes was two years out of annual. When I asked the owner why it had been three years since the last annual, he explained that he had been "ripped off" by the mechanic who had done the last inspection and would not allow that to happen again. The owner of the other airplane, which was six months out of annual, claimed the inspection had been done but not recorded in the logs.

Potential Disaster

Many pilots do not preflight their airplanes or only do cursory walkarounds. There is a potential for disaster here. One airplane I fly is kept in a community hangar where each aircraft owner may move others to get one airplane out. It is possible that someone could do some damage to another airplane and not say anything about it. If I were to fly that aircraft without preflighting it, I would be inviting Murphy to knock on my cockpit door. Good preflights can also alert you to problems that require immediate attention, or discrepancies that could become problems in flight. If you find a discrepancy during a preflight, have a mechanic look at it.

Not long ago, I was preflighting a Cessna *Citation* and noticed that the oil in one of the engines was almost black. Jet engine oil is usually clear or straw-colored and seldom changes color very much. Suspecting a serious engine problem, I grounded the airplane and sought out a mechanic. It turned out that one of the engine's main bearings had "coked," contaminating the oil in the process. The engine had to be disassembled and the bearing replaced. That engine would have failed in the next several hours, had it been flown in that condition.

Another point to be made regarding preflight inspections is that one time around the airplane at the beginning of the day is not enough. At the very least, you should walk around the aircraft before subsequent takeoffs. Once, a pilot taxied his *Cherokee* into the tail of my Cessna 310. While he was inside looking for me, I was outside getting ready to leave. Had I not walked around the airplane, I might have taken off without knowing about the damage done to the tail section.

Fuel Checks

If you are not present when your airplane is refueled, make doubly sure you check the fuel and security of the caps. If jet fuel is put into a piston engine airplane's tanks, the engine will most likely quit shortly after takeoff. Jet

Oil is as important to the engine as fuel. Make sure the oil level and coloration are correct for your aircraft.

fuel is clear and has a thick, oily touch and smell. The best way to avoid a mixup in fuels is to stand by the airplane while servicing is in progress. Check the decals on the fuel truck and drain the airplane's sumps. Check the color and smell of the fuel samples. Being there during refueling will prevent the need for a time-consuming draining and cleaning of the tanks, to say nothing of the mess you would have if you took off with jet fuel in the tanks and had a forced landing just off the airport. [See the article on page 6 for detailed information on misfueling—Editor]

Several times a year, we hear stories of airplanes that had not been flown for long periods of time being involved in mishaps and, too often, fatal accidents. A lot of the crashes are caused by fuel contamination or lack of maintenance. I remember a pilot who showed me an aircraft he had just purchased. He boasted about the low-time engine and how it would last him years and years. A month later, he was doing a top overhaul because of a lack of compression in most of the cylinders. Piston engines that are not flown regularly will deteriorate. Cylinder walls can rust from lack of use, causing excessive ring and cylinder wear when put back to work. This particular engine was overhauled 10 years before and had only been flown 50 hours since. Most engine operating manuals provide recommendations that should be followed if an airplane is not flown for long periods of time.

If you must fly an airplane that has not been flown for a long time, get a mechanic to inspect it and sign off the logs. The mechanic will check the fuel system for water or other contaminants and the airframe for control continuity, bird nests and other things that might present a problem during flight. If you are not a licensed mechanic, do not do this yourself. There are many reports of pilots who drained fuel until they were satisfied there was no more water, only to have the engine quit on takeoff.

Complying with AD's

Another thing to be aware of in any aircraft is compliance with applicable airworthiness directives (AD). AD's can be issued at any time and may ground an aircraft immediately or at some point in the future. Several months ago, a Cessna 180 took off from my home airport only to crash just off the airport property. While the official word is not out yet, it is possible the AD which affects most Cessna seat rails was overlooked. Investigators are checking the possibility that the seat had not latched and slid backwards during the takeoff.

Mechanics must check AD's during each annual inspection. Some mechanics are more thorough than others when it comes to this tedious job. However, an AD issued against an aircraft or accessory will affect its airworthiness. It becomes the pilot's responsibility if he or she flies an aircraft affected by an AD that has not been complied with in the required time frame. Similarly, if you fly an aircraft after maintenance has been completed but before the appropriate entries have been made in the log books or aircraft records, your aircraft is not airworthy.

As mentioned earlier, the FAR require that a mechanic make the appropriate entries in the aircraft records before returning the aircraft to service. They also require an owner or operator to ensure that those entries have been made. An occasional review of the log books for the aircraft you fly will alert you to maintenance inspections that are coming due. It can also serve as a reminder for altimeter and encoder certification dates and other items that are often forgotten.

Summary

After maintenance has been done, make sure the mechanic has made the necessary entries. Be cautious when dealing with a "hangar queen" or an aircraft that has been sitting for a long period of time. Watch for AD's that affect the types of aircraft you fly. The required work should be accomplished within the time frames set forth in the directives.

Before you fly any aircraft, it is up to you to be certain that it is airworthy. In reality, it is more than just following the rules for the sake of the rules. It is following the rules so that you will have a safe, uneventful flight. ■

This article has been reprinted courtesy of Aviation Safety *magazine. For further subscription information, contact* Aviation Safety, *Subscription Services, P. O. Box 420234, Palm Coast, FL 32142; (800) 829-9162. The cost is $84 a year for 24 issues; $6 for single copies.* ***—Editor***

by Dean Chamberlain, *Associate Editor*

Seen any pink elephants lately? Well, what about pink circles? No, we haven't been off oxygen too long. We are talking about the pink circles (Shown above and officially known as geographical position or control point markings) along the taxiways at the Seattle-Tacoma International Airport as well as some special taxiway lighting and stop bar lighting there. Soon you may be able to see similar markings and lights at other airports around the country. It is all part of an ongoing FAA and industry demonstration project to increase airport safety and airfield operations.

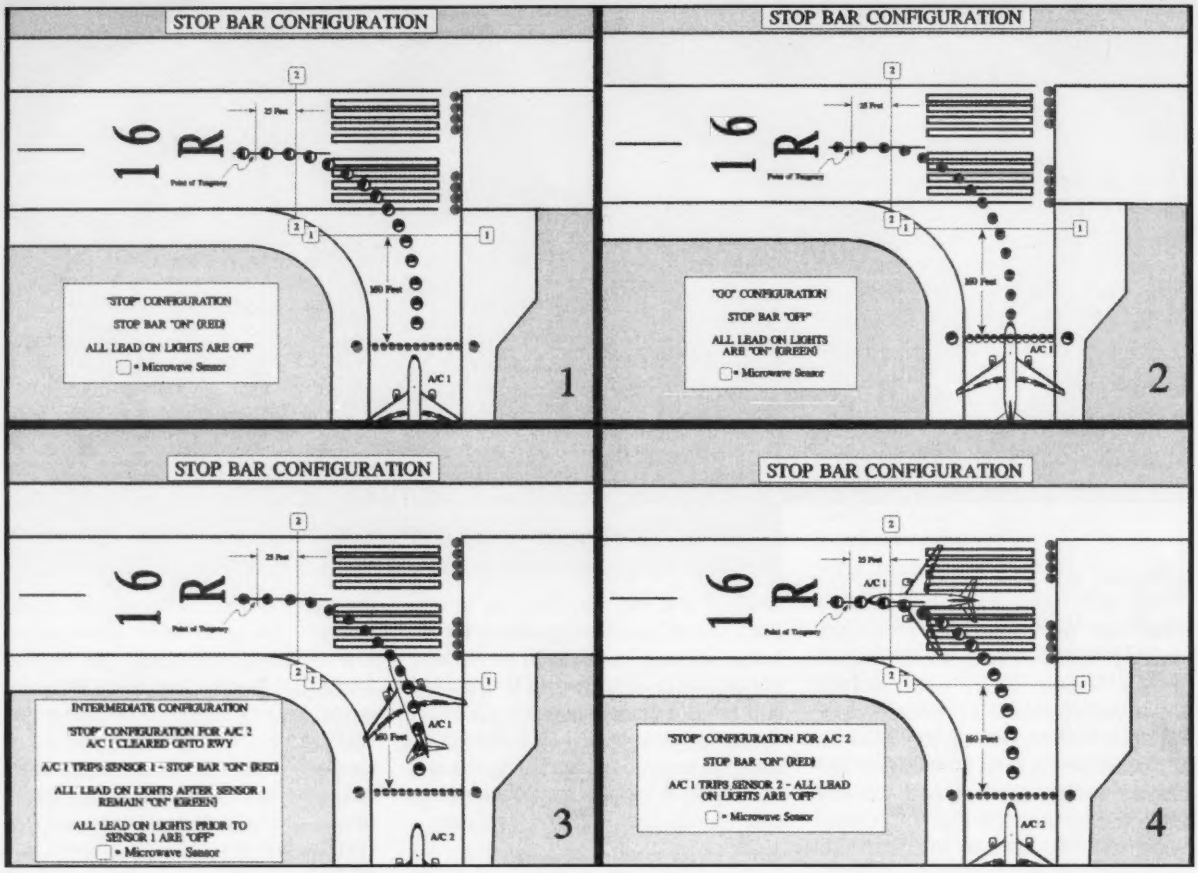
As a result of several low visibility runway incursion accidents at airports in the U.S., the FAA and the aviation industry are testing several visual aids designed to reduce runway incursions during periods of low visibility as part of the FAA's national Runway Incursion Plan. The devices, based upon International Civil Aviation Organization (ICAO) standards, allow aircraft to operate in visibility conditions of 600 feet RVR or less depending upon aircrew certification and equipment. Under the plan, select crews can fly Category IIIb IFR approaches down to RVR 300 conditions. Seattle, the first demonstration airport, has IFR approaches approved down to 300 feet landing visibility.

Advisory Circular (AC) 120–57, "Surface Movement Guidance and Control System (SMGCS)," dated September 4, 1992, contains the requirements to operate in low visibility conditions using SMGCS and the new stop bar lighting plan. The AC provides guidance for airports wanting to operate in visibility conditions of less than 600 feet RVR and for all airports requesting Category III landing authorization. The AC's guidance will apply to all airports conducting operations in visibility conditions of less than 1,200 feet RVR by January 1, 1995.

In concept, when operated by air traffic control (ATC) during visibility conditions of 1,200 feet or less, SMGCS and its stop bars, wig-wag lights, and pink circles will all combine to provide aircrews and ground operators positive ATC guidance and control on select taxiways and runways during low visibility conditions. In addition to the use of special guidance and control lighting, SMGCS also calls for special control point markings to be painted on the taxiways approved for low visibility use. These pink circular numbered markings along the taxiways provide positive ATC control of aircraft and ground vehicles along low-visibility taxiways by providing a means of identifying known locations and holding positions along the route. Yellow, in-pavement lights will also identify the location of the taxiway holding points. Special flashing amber lighting (called Wig-Wags because of its two alternating flashing amber lights) mounted in boxes installed along side the pavement will identify an entrance to an active runway.

Although the special lights, markings, and airport charts will help guide aircraft to and from designated low-visibility runways, the key to SMGCS is its stop bars and their associated lead-on lights. As shown in the illustrations, the lights provide visual confirmation of ATC verbal approval for aircrews and vehicle operators to move onto or to cross a runway in low visibility conditions by turning on and off both the red stop bar lights and the green runway lead-on lights. Located at the instrument landing system (ILS) critical area holding location on illuminated taxiways, red stop bar lights are installed in the pavement across the hold line. The stop bars may also include two elevated edge lights at airports in the snow belt or for cockpit cutoff angle visibility considerations. When the stop bar lights are manually turned off by controllers in the tower, the lead-on lights come on to guide the aircraft onto the runway. The stop bars are reset on automatically after the aircraft crosses a sensor. This prevents a second aircraft from entering the runway without clearance. The stop bar lights confirm ATC instructions for aircraft to hold at the stop bar position by showing illuminated red stop lights to approaching aircraft and vehicles taxiing to the runway. In addition, the green lead-on lights leading from the hold line to the runway centerline will be off.

Figure 1 shows an aircraft, Aircraft 1, holding at the red stop bar lights. The



red stop lights across the taxiway are on. The green lead-on lights are off. In Figure 2, the tower has *verbally* cleared Aircraft 1 onto the runway and has manually turned the red stop lights off. All of the green lead-on lights are turned on. The green lead-on lights provide guidance to the runway centerline and confirms the aircraft is cleared to taxi to the centerline. Figure 3 shows Aircraft 1 at an intermediate position. As the aircraft crosses a sensor located at Point 1, the red stop bar lights automatically turn on behind the aircraft, and the green lead-on lights from Point 1 back to the stop bar lights turn off. The green lead-on lights from Point 1 to the runway centerline remain on to guide Aircraft 1 to the centerline. The "on" red stop bar lights now stop Aircraft 2 from taking the runway without ATC approval. The "black hole" left after the green lead-on lights have been turned off by the sensor at Point 1 serves as a reminder to the crew of Aircraft 2 not to cross the now "on" red stop bar lights. Figure 4 shows Aircraft 1 aligned on the runway centerline. As Aircraft 1 takes its position on the runway centerline, it crosses a sensor at Point 2. The Point 2 sensor then turns off all of the remaining lit green lead-on lights from the centerline back to Point 1. The key safety point in the red stop bar concept is that no pilot or ground operator should taxi/drive over a lit red stop bar. Simply stated, red stop bar lights on—all aircraft/vehicles stop. Once ATC *verbally* clears an aircraft holding at a lit red stop bar onto the runway and turns off the red stop bar lights, the pilot can then follow the now "on" green lead-on lights to the runway centerline. Any questions regarding the meaning of the stop bar system must be resolved with ATC before an aircraft or vehicle moves onto the runway.

Pilots will also see stop bars at intersections which are not to be used for entering a runway. If these intersections are not part of the published low visibility route, they will remain on and are not controlled by ATC. Some airports are using stop bars in all weather conditions to prevent pilots from taxiing the wrong way on a high-speed exit.

Combined with the other features being tested at Seattle and being developed at three other demonstration airports, SMGCS should reduce the runway incursion problem by providing positive ATC control of and positive position guidance for aircrews and ground operators on designated taxiways and runways during low visibility operations. The overall benefit for everyone will be increased safety and better use of the air transportation system. ■

For more information, Advisory Circular 150/5340.1G, "Marking of Paved Areas on Airports," is available free from DOT M–443.2, Washington, DC 20590. ***—Editor***

Answers to Quiz: 1–H, 2–F, 3–D, 4–E, 5–G, 6–C, 7–B, 8–A

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WAIT...and Balance!

by Bruce Edsten, *Accident Prevention Program Manager, Louisville, Kentucky*

Just for a MOMENT, let me take you by the ARM and talk about aircraft LOADING....

Volumes have been written on the subject of aircraft weight and balance! Just about every book you pick up on the subject of aviation has at least a full chapter on it, and several stand-alone issues have come out as well. Anything that even resembles an Airplane Flight Manual (AFM) for any airplane has an appropriate section, and even if your bird is old enough that no AFM was ever printed, the FAR require that the minimum information necessary to calculate a safe loading situation be on board.

Given all that, everybody ought to be totally familiar with all the possibilities and ramifications of proper and improper observance of weight and balance restrictions, right? Yeah, well, you'd think so, but it apparently doesn't work that way because people keep on wrinkling perfectly good airplanes through dumb loading.

Weight

Let's look at weight first. Most people are pretty well aware that their trusty old bird will actually lift a lot more than the listed gross weight. Somewhere they read that the structure is rated at three-point-something-or-other "G's," and they know that in a 60-degree bank, the wing has to produce lift equal to twice the weight of the airplane in order to maintain level flight. So, given that, what harm could a teensy little overload do? If that wing will so easily hold up 4,000 pounds, a couple hundred pounds on top of that excessively conservative 2,000 pound max gross ought to be a piece of cake, right? Wrong!

Even a little overweight condition can get you in deep trouble, because the effects are hard to judge and probably cannot be extrapolated from aircraft documents such as the AFM or Pilot's Operating Handbook (POH). For instance, a 10% overweight condition may result in a 10% decrease in performance, but the degradation could be a lot greater. Then, too, the effect may be different for a different performance characteristic. For example, let's just list the factors that will be affected in a negative way by overloading:

- Increased stall speed
- Increased runway length for takeoff
- Increased speed required for takeoff
- Decreased rate of climb
- Decreased maximum altitude
- Decreased range
- Degraded controllability and maneuverability
- Increased approach speed
- Increased runway length for landing
- Decreased "G" tolerance

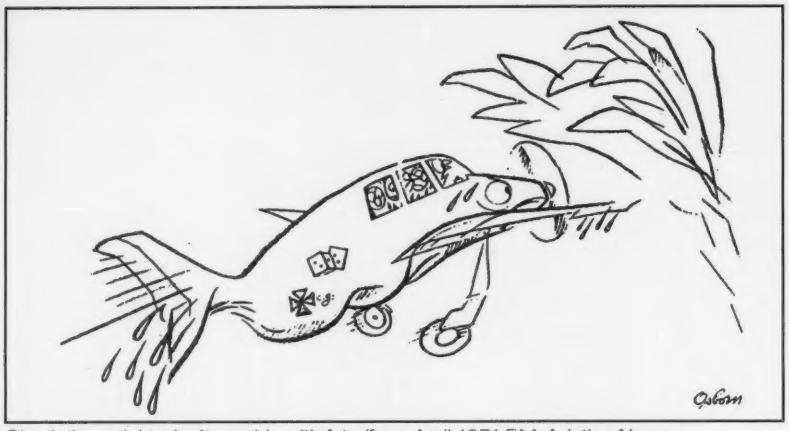
To what degree will each be affected? Well, if you are the adventuresome type, you could always get a brightly painted crash helmet and paint "EXPERIMENTAL" on the side of your trusty old Cessna or Piper. In any case, when you start overloading, whether you mean to or not, you WILL be a test pilot! Then, you can go fly the machine and find out what effect the overload has, but, as they say, if you don't want to hear the answers, don't ask the question. Actually, in this case it's a matter of being prepared for the full range of possible answers!

Balance

Controlling the weight is important to be sure, but if you inadvertently mess up, weight—not balance—is the place. [Intentional overloading of any aircraft is never acceptable.—Editor] Structural integrity is designed into every aircraft to such a degree that many overloads go unnoticed. However, even an airplane that is loaded a very great deal below is maximum allowable gross weight can be totally unsafe to fly if the weight is in the wrong place.

The reason for this is elevator limitations, and it is almost exclusively elevator effectiveness that determines that airplane's center of gravity (CG) limits. For example, the forward CG limit must be established to ensure that the airplane can still be pitched up enough to flare at the minimum approach speed.

So, what will happen if your airplane is loaded too far forward? Let's look at a possible scenario. On takeoff, you notice that the normal application of back pressure does not raise the nose



Check the weight, don't gamble with fate (from April 1971 FAA Aviation News. *Congratulations to Mr. Robert Osborn on his 50 years of aviation safety cartooning.)*

in the normal fashion. "Hmmmmmm," says you, but there is no cause for alarm just yet, since there's still a couple thousand feet of runway ahead. Then, a few seconds later, the nose comes up, albeit a bit sluggishly, and at a few knots more airspeed than usual, but it does come up, and you're safely over the trees and gone.

On final approach to your destination airport, all goes apparently well until very short final. Now, you go for that last bit of nose up to make your customary "squeaker" landing, but the elevator control hits the stops, the nose stays about two degrees down, and you land nosewheel first, followed in rapid succession by the mains. Next is a huge bounce, and another really sharp pitch down, and a second "arrival." If you're lucky, it stops there, and the structural integrity saves your bacon. If this just is NOT your day, the second "arrival" (or third or fourth) could cause you to crunch the nosewheel, wheelbarrow off into the weeds, or simply collapse the whole machine in a heap in the middle of the runway. Uncool.

Bent and broken airplanes aside, most of these situation are survivable, and if the out-of-CG condition is not too bad the only damage may be to the airman's pride. Frequently, the lack of pitch up capability is noticed early on as the aircraft is slowed to pattern speed, or the pilot may simply be aware of it because of a requirement for excessive "nose up" trim in cruise flight.

Elevators and Balance

Elevators do what they do through aerodynamic lift, of course, and lift is a function of angle of attack and airspeed. The elevator has fixed limits, so the angle of attack can only go to a certain maximum value, but the elevator can be more effective at the same deflection if it is operated at a higher airspeed. That's what happened above on the takeoff roll, right? The nose *eventually* came up as the airspeed got faster.

Of course, you should have paid enough attention to what you were doing so that you never got here in the first place, but now that you're here, and you *know* you have a pitch problem, what can you do about it? Landing at a higher speed may be your only way out. The use of an appropriate flap setting might be useful, too, depending on how flaps affect pitch on your particular airplane. Don't forget that the higher speed may require a flatter approach and will almost certainly require more runway, too!

Aft CG Limits

How about a pitch problem the other way around? This is the situation that really gives me goosebumps, makes the hair stand up on the back of my neck, and produces that weird tingle at the base of my spine. Out-of-CG-AFT. Scaaaaaaar-eee! Well, I guess we don't need to be overly dramatic, but I have been fortunate (?) enough to have been an in-person observer of this situation and lived to tell about it. Unfortunately, the accident reports are full of accounts of those who did not because these accidents tend to be less survivable.

The aft CG limit is more critical because of the problem of stability. The further aft the CG goes, the less stable we get. Specifically, moving the CG aft will eventually result in an uncontrollable pitch up condition, which results in a stall that cannot be recovered from. The problem, of course, is the elevator. Simply not enough force available to get the nose down.

Once again, the elevator can only produce so much aerodynamic lift, so the aft CG limit has to be established to allow the elevator to do its thing down to and beyond the stall speed. As you will no doubt recall from stall training, the airplane is supposed to pitch down entirely on its own, even with full "up" elevator, upon reaching V_{so} or V_s1. In other words the airplane basically recovers from the stall by itself. This is good! Get that CG a little past the aft limit, and the airplane may need some help, like at least relaxing the back pressure. This is still not too bad. Go a bit further, and a lot more positive, decisive help may be necessary, like full forward elevator. This is NOT good! The next step is the one related above, where all the help available is not enough.

In many cases, this condition will be noticed before you even get in the airplane. The thing may have simply fallen on its tail or at least be looking like it's about to! If you're really lucky, the nose may come up immediately upon the start of the takeoff roll, giving you plenty of time to abort, but it could happen later in the trip down the runway, and the result is frequently disastrous. If there is enough airspeed to fly but not enough for the elevator to produce sufficient lift to hold the nose

down, the airplane will lift off, pitch up, and stall back onto the runway.

An Example from Real Life!

As a very junior first officer with a commuter airline, I found myself looking at just about that position one day. The station personnel had produced a manifest which declared that our 19-seater was about two pounds below the 12,499-pound max gross and right up against the aft CG limit. Normally, this thing would leap into the air after about 1,200–1,500 feet of ground roll, but even taxiing out, it didn't feel right. We were so heavily loaded that the gear was bottoming out as we rolled over each of the expansion joints in the ramp!

Fortunately, the runway 35 we had before us was over 11,000 feet long, so we would have about 10 times what we needed (normally), and it's slightly downhill, too. Tower said go, so we stood up all the handles, shouted "Hi-yo Silver," and waited. Still didn't have flying speed passing the 5,000-foot marker, and I knew we were in trouble. (Bet you can't guess whose leg it was, can you?) Eventually, the airspeed got to the appropriate point, and I started back with the elevator, whereupon the nose popped up like a cork! I jammed the wheel full forward and hollered, "Trim!" The Captain sez, "Which way?" I said, "Down!" He sez, "How much?" I said, "All of it!" and we whistled off the end of the runway some two miles plus from brake release, about 50 feet up, and about a knot and a half above V_{mc}!

Happily, there are not a lot of obstacles close to that airport, and the route to the next stop was mostly over water, but we still had a problem! How slow can we get this thing before we run out of elevator? Some experimentation (We are now test pilots, remember?) showed that we would probably be okay as long as we landed about 30 knots fast, which is just what we did. I have no idea how far over gross we were or how far out of CG, but it was plenty! Basically, I was told not to worry about it, but I did, with ample justification.

A year later, the company's policy caught up with it in St. Croix, U.S. Virgin Islands, when an almost identical situation produced a crash that killed the first officer and several passengers. It was found out that many manifests were, to put it mildly, pure fiction, and probably thousands of overgross and out-of-CG flights had been made through the years. The airplane that crashed had been loaded several hundred pounds over the limit but most importantly nearly 50% of the CG range beyond the rear CG limit!

Once again, you should never get there in the first place, but if you do about the only way out is the extra airspeed, which is the only way to get elevator to generate a bit more aerodynamic lift. Proficiency in flight at minimum controllable airspeed ("slow flight") will be a big help too, because you really don't want to stall this thing when it's out of CG. Much better to recover from "slow flight." And, worst of all, if you have the aft CG condition and allow it to progress beyond the stall and into a spin, there may be no way out at all, since aft CG conditions tend to make spins go flat.

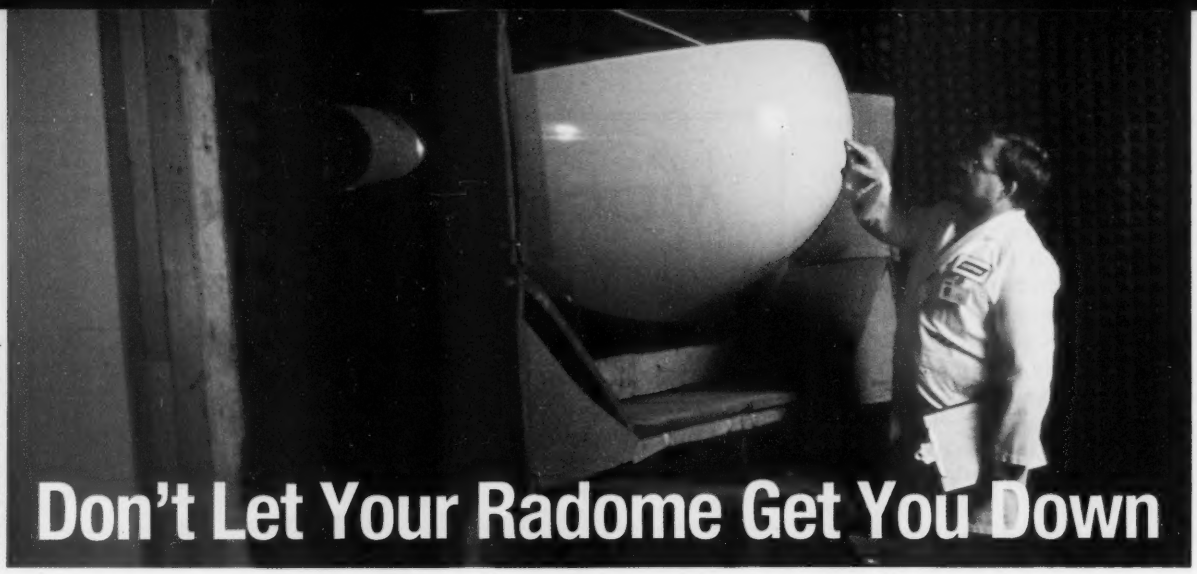
An Ounce of Prevention...

Of course, you could do all your homework and still find yourself in one of these situations by accident. In any case, there are clues to look for, such as how does the airplane perform on takeoff, and how does it feel as you enter the pattern? Also, did it require excessive nose-up or -down trim in cruise? Pay attention to what your trusty air-machine is telling you. If everything is not normal, beware.

Most pilots get pretty familiar with a particular airplane and tend to overlook the actual weight and balance data once they have an idea about what it will take, but there is danger here, too. You should sit down and figure a problem in detail once in a while just to refresh your memory. Work it out to the last fraction of an inch-pound whenever you get close to any maximum.

There is no excuse for going flogging off into the blue with your airplane improperly loaded! ■

This article originally appeared in the January 1993 edition of Mr. Edsten's Accident Prevention Program Newsletter. *If you are interested in attending Mr. Edsten's "Wings" Weekend in September, contact him at (502) 582–5941 for more information.* ***—Editor***



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Don't Let Your Radome Get You Down

by Ben Mackenzie

One of the least understood aspects of weather radar performance is the role of the radome. This is as true in general aviation as in air transport or military aircraft. The fact is, design and condition of the radome dramatically affect the range of the weather radar and how accurately its screen "paints" the weather ahead. In other words, the radome affects the radar's vision as the windshield does the pilot's.

A new Minimum Operating Performance Standard (MOPS) for weather radar radomes being developed by the Radio Technical Commission for Aeronautics (RTCA) will underscore this fact. The final draft has been reviewed by the industry and has been approved by the RTCA. The standard creates five categories for radomes: Class A for those radar systems requiring higher radome performance; for example, Forward Looking Wind Shear Detection/Avoidance; and Class B through E for applications where higher performance is not required; for example, Weather Detection. Side lobe levels are also addressed. (Side lobe refers to that portion of the radar energy that does not go out straight ahead. Pilots would recognize this as "scatter.") Category 2 (Classes B through E) essentially duplicates the requirements that have been used in the past for weather radar, while Category 1 (Class A) requires a tighter control over side lobes and is intended for predictive wind shear radar applications requiring this level of performance. Side lobe levels are the same except if the plane has predictive wind shear which is rare in general aircraft.

Obviously, the new MOPS will affect those who elect to install these new radar systems in their general aviation aircraft. Persons involved in the design, operation, and maintenance of weather radar systems will also be affected. On the one hand, the new MOPS will set higher electromagnetic performance standards on new Class A weather radomes. On the other, for the first time it will also cover the radomes which have been designed to this specification after they are in service. The draft calls for retesting of radome transmission efficiency after any radome repair that could affect electromagnetic performance. Also, whenever Doppler radar for predictive wind shear detection is added, the installer will need to ensure that the radome he or she is installing will meet the Class and Category required by the radar manufacturer.The obvious plus side will be enhanced flight safety and a clearer, more accurate portrayal of weather further ahead over the entire life of the radome. The price of this is that radomes will have to be built, repaired, and tested to a standard over their entire operating life. The radome's electromagnetic characteristics must be kept within specification values in the same way the radar system must for proper operation.

Radome electrical performance over life is a new notion in some areas of the aircraft industry. There have been no government regulatory standards directly addressing repairing and retesting radomes. FAR § 43.13 applies to radome repair, but the word radome is not present. Perhaps that is why knowledgeable people in the industry figure that half of the radomes in service today would not even meet the present standard. The main reasons are improper repair, excessive paint thickness, a lack of understanding about the harm moisture can cause, and how easily moisture can penetrate a radome, etc. More on these points later.

Standards and regulations aside, paying attention to the electromagnetic performance of radomes is, as Wilfred Brimley puts it, "the right thing to do." Certainly it's the safe thing to do. Let's look at a couple of recent cases in flight operations that point up the role of radomes in a weather radar's ability to perform.

About two years ago, pilots of a European commuter airline began regularly complaining of seeing storms two miles ahead of their aircraft on their radar indicators. This happened when flying in perfectly clear air at 10,000 feet. The problem occurred over their entire fleet of a particular make of aircraft equipped with a particular radar set. The problem

was so severe, the fleet faced grounding by Swiss authorities unless the problem was resolved by a specific date. Making a long story short, the avionics shop manager for the airline naturally first suspected the radar systems. The radar systems checked out fine, and the radar manufacturer's field engineer suggested checking out the radomes at a radar test range in Ohio. Sure enough, the radomes typically checked out with only 78% transmission efficiency (the acceptable minimum at present is 85%).

Substandard transmission efficiency explained why the pilots were seeing non-existent storms on their screens. The radome was not "tuned" correctly and therefore the top portion acted like a partial mirror to the radar energy. It reflected a portion of the outgoing signal, producing a side lobe of energy 90° straight down. As a result, the screen was "painting" the ground 10,000 feet below the aircraft as a storm two miles ahead of the aircraft.

To solve the problem, new radomes were designed with a transmission efficiency of 93° including lightning diverters and paint. In operation, this improvement not only eliminated the false storm in front of the aircraft, but also translated to a doubling of the radar's range—without changing anything. The new radomes are now standard equipment on that particular make of aircraft and standard replacement radomes for the airline's entire commuter fleet. Also, the new design's structure has been strengthened to withstand a dive speed 110 knots beyond that of the present aircraft. (This allows for growth in the flight envelope for future aircraft designs.) The new design also includes a new state-of-the-art lightning diverter system that effectively stops lightning punctures through the front of the radome that had occurred with earlier designs.

The reverse can happen as well, sometimes with tragic results. At about the same time in the U.S., a radome went back into service after being field-repaired for damage on its front center area. However, the radome was not tested for transmission efficiency after the repair. The result of the repair was satisfactory transmission efficiency left and right, but suspected degraded performance dead ahead. Two flights later, the aircraft was flown directly into a thunderstorm. It came apart and fell to the ground in pieces, killing all aboard. It is suspected that because of the radome, the radar screen painted a pattern of severe storms on either side and a corridor of less severe weather straight ahead. In this condition the pilot selected a route straight ahead, with the inevitable tragic result.

Clearly, the relationship between a weather radome's electromagnetic performance and flight safety is direct. Unless the radome is properly designed for the aircraft and the frequency of the radar system, the radar system simply cannot perform to the level it was designed for. This is one reason why radar manufacturers are happy with the new MOPS that have been developed. They contributed to it in a major way. The installation and operation manuals of most general aviation weather radar systems call for installation behind a radome with 90% average transmission efficiency.

So far, we've only discussed radome performance as it affects today's weather radar systems. The fact is, the approach of Doppler radar for predictive wind shear detection will place an even greater importance on radome electromagnetic design and performance. This type of radar system will require an antenna with very low side lobes (lobes of energy outside the main beam). Low side lobes prevent ground clutter from masking over the signal being reflected back from the wind shear event in front of the aircraft. For optimum radar performance a radome that will be used with this radar system must maintain the low side lobe level to the degree required in the new radome MOPS.

Creating such a radome is an issue for the radome designer. It is achieved by balancing radome material, dielectric constant, loss tangent, and type of construction with the electromagnetic, structural, and lightning protection needs of the application. Once the radomes go into service, it then becomes the responsibility for the repair technicians to maintain the radome at the level required by the MOPS. In fact, it may be necessary to send such radomes to specialized repair and testing stations rather than attempting field repairs.

Moisture—the Main Enemy

Moisture in the radome is perhaps the most serious enemy of radar performance. The reason is simple: water is partially opaque to radar frequencies. Wherever water collects in the radome, the transmission efficiency could be reduced by as much as 30%, depending on the size of the affected area and the quantity of water present.

Water very readily penetrates even the smallest microcrack or pinhole on a radome surface—even through openings too small for the eye to see. The cracks may result from impact and pinholes from static burns. When the aircraft descends from cruise altitude in a wet environment, increasing air pressure equalizes through the hole and into the structure, taking water with it. During subsequent flights above the freezing level, the freezing water causes more microcracks. . . and the moist area enlarges. [Pilots should carefully inspect their radomes for visible cracks and pinholes as part of their daily preflight. —Editor]

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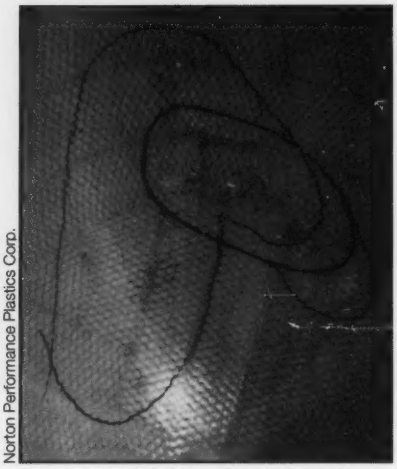
A technician scans a radome with a moisture meter to determine if moisture is present in the radome. Moisture scanning is a primary and simple trouble-shooting step, but radomes finished with antistatic coatings must be checked from the inside for accurate readings.

Unless this moisture is removed during radome repairs, it can be encapsulated forever, making the impaired transmission permanent. This is why it is so important for maintenance technicians to run a moisture meter over the radome during maintenance checks and especially before repairing the radome. The procedure to remove the water, in most instances, is for the maintenance technician to first remove the inner skin behind the affected area and dry the area by placing the radome in an oven at 125°F. Then a new inner skin must be installed. Also note that if an anti-static primer or paint is on the radome, the moisture meter can show it as moisture when there is none present. In addition a reading of no moisture is not an indication that the radome is satisfactory. There could be an improper repair, excessive paint, or even a flawed design present that reduces the radome's performance below the radar manufacturer's requirements.

Repair—More than Structural

This brings us to repair. Unfortunately, all too few field repairs are made with any thought to how the repair affects transmission efficiency of the radome. One indication of this is the scarcity of proper test ranges at radome repair locations. Few U.S. airlines have radome test ranges and, to my knowledge, virtually no FBO's have them. Some of the airlines and FBO's send their radomes to appropriately equipped, FAA-certificated radome repair stations for repair and/or testing when they are not equipped to do this themselves.

The unfortunate fact is that, in a large number of cases, radomes are regarded—and repaired—as nothing more than a structural or aesthetic member of the airframe. Little or no regard is given to its electromagnetic function. That's a serious oversight. This is also the main contributor to the substandard transmission efficiency of most radomes now in service. Small wonder, then, that so many pilots don't fully trust the information on their radar screens.



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A look at the interior surfaces of a radome shows how damage inside can be greater than what appears outside. This is why thorough diagnostic procedures call for both interior and exterior examination.

Also overlooked is the issue of paint. Thickness and application of the paint on a radome can affect its transmission efficiency by several percentage points. Sometimes, paint can degrade performance exponentially. Advisory Circular (AC), 43–14, "Maintenance of Weather Radar Radomes," addresses radome maintenance quite well.

Seven Key Hints

What can the aviation pilot and maintenance technician do to keep radome transmission efficiency at its maximum?

1. Understand that the radome can directly and significantly affect the weather radar's ability to perform correctly.
2. Be sure to periodically check for moisture in the radome's internal structure. Be sure to check both inside and outside surfaces. Moisture is the main enemy. It can be present internally even if the surface looks perfectly fine. Good moisture meters are a very affordable for an avionics shop, and the procedure takes just a few minutes.
3. When repainting keep paint within the thickness limits. It is best to remove old paint layers, being careful not to take off any of the radome structure itself. It is the thickness and composition of the entire material system—structure plus exterior coatings and lightning diverters—that determine the radome's overall performance.
4. Always have the radome tested for transmission efficiency after a major repair of a type which can degrade the radome's performance. Some radome repair stations rent "loaners" so you can keep flying while your repaired radome is being checked out.
5. Unless the repair is truly minor, consider having it done by an FAA-certificated radome repair and testing station. It can make a big difference in weather radar range and performance and, ultimately, in flight safety. Many repairs done by well-meaning technicians actually do more harm than good.
6. If the radar system bench checks normal and meets manufacturer's specifications but displays false targets or reduced range, suspect the radome, not the radar.
7. If your radome is beyond repair, check out an independent radome manufacturer for a replacement. You may get better prices, better delivery, and a better performing radome.

Obviously, radomes play more than a structural role in today's weather radar-equipped civil aircraft. Not so obviously, there's more to radome performance than meets the eye. ■

Mr. Mackenzie is an aeronautical engineer, a designated engineering representative of the FAA in structures and systems and lightning protection for radomes and composite structures, an instrument rated commercial pilot, and an extra class amateur radio operator. He has been involved in radome design for 19 years and is on the RTCA committee that drafted the new radome MOPS. He is also on the steering committee of a joint international program on lightning and static charge protection of radomes and fairings. He is the Director of Technology and Engineering, Norton Performance Plastics Corporation Composites Operation, Ravenna, Ohio. ***—Editor***

Smithsonian

Women's changing role in aviation finds them everywhere from the FBO to the airline cockpit to the space shuttle—Amelia would have been proud.

Part 1 of this article appeared in the March 1993 issue of FAA Aviation News *and covered women in aviation from the early part of the 20th Century through World War II.* ***—Editor***

Through the Years

A Look at Attitudes toward Women in Aviation

by Kristine Kjos, *FAA Evaluation Specialist*

Part 2

THE POST-WAR YEARS AND BEYOND

After World War II, the women who stayed in aviation-related jobs did not have much to choose from. Women were no longer a rarity in aviation, and this sometimes worked to their disadvantage when applying for jobs. A lucky few were able to do some flight instruction or fly for aviation businesses. Olive Ann Beech even headed Beech Aircraft Corporation with her husband. Most settled for support jobs, such as pumping gas, ferrying old surplus aircraft that were widely available after the war, doing secretarial work for companies, or working as flight attendants.

As technology advanced, women delved into new aviation areas. The increasing use and development of helicopters in the late 1940's broadened aviation capabilities enormously and caught the attention of some daring women aviators. People used helicopters to give tours, for military purposes, and for search and rescue. In 1947, Ann Shaw Carter was the first woman in the U.S. to earn a helicopter rating. Other women soon followed suit, including Jean Ross Howard, who in 1955 founded the Whirly-Girls, a group of women helicopter pilots whose primary aim was, and continues to be, to promote interest in helicopters. The group has provided scholarships to women for helicopter ratings, promoted aviation safety through publications and meetings (or "hoverings" as they are called by the Whirly-Girls), and has been active in increasing the number of heliports in the United States.

Women continue to fly helicopters in all of the original ways, as well as for traffic reporting, air taxi, fire suppression, pipeline patrol, spraying, photography, and of course for instruction. Some women have even received their helicopter ratings before they received their driver's licenses. Kim Darst is such a woman. After obtaining her certificate in March 1987, Kim surprised her high school graduating class later that spring by landing a helicopter on the field at the ceremony. She now owns her own helicopter business.

OPPORTUNITIES IN THE MILITARY

During the 1950's and 1960's, opportunities for women in aviation increased steadily but not always quickly. Most women held jobs in the civilian sector but as the 1970's approached, women began to examine military aviation possibilities. As with all new areas that women have entered, questions arose about what women should and should not do. One question is still unresolved today: Should women be allowed to fly for combat purposes? The answer remains the same. According to the U.S. Code, "Federal law prohibits women...from directly engaging in aerial combat...delivery of munitions or other destructive material against an enemy and duties where enemy fire is expected and where risk of capture is substantial." Yet, some feel the reversal of this law is imminent. In 1991 Congress distanced itself from the issue by voting to allow the individual military organizations to set their own policy on women pilots performing combat roles.

The Navy was the first military branch to allow women pilots. In 1974, Barbara Ann Rainey was the first woman to earn Navy wings. Several other women soon joined Rainey in this honor. At the time, there were three "pipelines" or specialization areas that Navy pilots could enter—propeller, helicopter, or jets. Women were not allowed to enter the jet pipeline because jets were fighter planes. They were also not allowed to land on aircraft carriers because this would constitute "assignment to a combat vessel." Seen eventually as discrimination, the first woman was finally allowed to become carrier qualified (in props only) in 1975. In 1982, women were able to earn their wings in the jet pipeline. Today women land aircraft on carriers as a normal part of training. Also in 1974, the Army opened its doors to women aviators. Sally Murphy was the first woman in the Army to graduate from flight training. Murphy has worked her way up the ranks and was given a battalion command in Japan in 1991. In Operation Desert Storm, women Army helicopter pilots flew on an air assault into Iraq, making history for women in combat zones. Women Army pilots are still excluded, though, from flying *Apache* or *Cobra* attack helicopters "that seek out and engage the enemy."

In 1976, the Air Force followed the Navy's and Army's leads and began to train women pilots. Eight years later, women finally qualified to fly tankers and continue to fly them today. Yet, the Air Force does not allow women to fly bombers or fighters.

MEDICAL CONSIDERATIONS

The controversy over military and civilian women flying grows more complicated still when the issue of pregnancy is introduced. Contradicting rules are currently in place for pregnant military pilots. The Navy restricts women from piloting aircraft during the last trimester of their pregnancy, the Air Force prohibits flying during the first and last trimesters, and the Army restricts flying for the entire pregnancy. The military is concerned about the effects of cockpit radiation on the unborn fetus. Surprisingly, the military does not restrict pregnant women from flying as passengers in aircraft and being exposed to the same amount of radiation in the passenger seat. Conversely, all civilian pregnancy restrictions have been rescinded. In 1939, the Civil Aeronautics Agency (CAA) had banned pregnant women from piloting aircraft. The CAA soon revoked this law but then imposed another—if a woman's pilot license expired during her "recovery" after birth, she would have to retake the written and flight tests. The Ninety-Nines had a strong hand in revoking these restrictions.

Whether it be military or civilian, women pilots have slowly entered every aviation field over the past few decades. Women are mechanics, airport managers, astronauts, fixed-base operators, and engineers. The Federal Government employs a large number of women in aviation-related positions, such as in air traffic control and aviation safety inspector positions. Women work for museums and educate school children about aviation. The Ninety-Nines and the Whirly Girls have thousands of members who promote flying and women's contributions to aviation. Women are corporate jet pilots, agricultural pilots, flying traffic reporters, and instructors. They fly for air-charter services, air ambulance services, and for forestry, photography, survey, and pipeline patrol purposes. And as in the scenario in Part 1 of this article, women are airline captains, first officers, and flight engineers.

AIRLINE JOBS

Despite all of the accomplishments of women pilots over the century, especially those of the WASP's, it was not until the early 1970's that women began to fly for scheduled airlines. (The only exception to this is Helen Richey who was the first woman to fly for an airline during a short stint in 1934.) Emily Warner became the first American woman "in modern times" to fly for a scheduled airline when Frontier Airlines hired her as a co-pilot in January 1973. Initially uncertain of the public's response to a woman pilot, Warner and Frontier Airlines were pleased with the positive reactions they received. When asked about the attitudes she encountered overall, Warner said the following: "I've never had any sexual harassment. Flying is so intense and so professional, when you're working you forget the gender of the person sitting next to you. That is not to say there wasn't a sexist attitude, however. My first flight was awful. The Captain looked at me and said, 'Just don't say anything in the cockpit.' He was the boss." Warner flew as Captain on a United Parcel Service Boeing 727 before retiring in May 1990.

The first woman to fly for a major airline (Frontier was only a regional airline at the time) was Bonnie Tiburzi, who began working for American Airlines in March 1973. "Most of the pilots were wonderful and supportive," said Tiburzi. Most of the hostility she faced

PROFILE:
Evie Washington—pilot, educator, CFI

Pictured above is Evie Washington, a pilot and aviation educator who resides in Washington, D.C. Evie is active in the Potomac Chapter (MD) Ninety-Nines and spends much of her leisure time flying as a mission rated pilot and as a cadet flight orientation pilot for the Civil Air Patrol. Although flying is not a full-time career for Evie, she can never spend enough time in the cockpit . She has been flying since 1984 and just earned her certificated flight instructor (CFI) rating and multi-engine instructor (MEI) rating.

So what is so admirable about Evie? Everything! Evie has had some unusual experiences while attaining her ratings. She encountered hurricane force winds and witnessed a *Navajo* crash during her first long solo cross-country, had her commercial checkride canceled eight times before she could finally go, experienced a total electrical failure while on an actual IFR flight, and had the landing gear handle fall off in her hand during her multi-engine checkride. Yet, one of the most admirable qualities about Evie (besides her ability to handle unexpected situations), is her ability to teach school children of all ages about aviation and related careers. Evie frequently takes time off from her busy career as a Federal government employee and travels to Washington, D.C. area schools, often speaking to disadvantaged children. Evie says the number one question is "How much do you make as a pilot?" followed by questions about the difficulties facing minorities who want to enter aviation careers. The children are shocked when they find out that Evie often does not get paid to fly, but rather pays for aircraft rental! Evie tells the children that the sacrifices are well worth the effort. She is a wonderful role-model and her aviation stories are never soon forgotten!

was not from the pilots but from others who felt she was taking away a man's job. But Tiburzi enjoyed her job too much to be intimidated by such comments. Her dedication to flying has resulted in her Captain's stripes and several aviation awards.

Several more women were hired by the airlines in the 1970's and 1980's and other "firsts" occurred. Cheryl Peters captained the first all-female jet crew on a U.S. scheduled airline on July 10, 1982. On July 19, 1984, Lynn Rippelmeyer and Beverly Burns were the first women to captain the Boeing 747. On January 16, 1986, Lennie Sorenson captained the first all-female crew on the 727. Sorenson again captained an all-female crew on a DC-10 wide-body jet in August 1987. Today, there are approximately 275 women captains flying for U.S. airlines.

Overall, women airline pilots feel they have been treated fairly. JoAnn Osterud, a flight engineer with United Airlines, describes her opinion of women in aviation: "It seems in aviation if you do your job right, eventually people don't really care what you are." Captain Denise Blankinship believes that the public has been "generally supportive." "[The public] realized that we have to earn our credentials. We wouldn't be here if we weren't qualified..." Gay King, a pilot who began with Piedmont Airlines (now USAir) in March 1987, admits that there are still some male pilots "in the dark ages," but "most of the captains are younger and seem to have gotten used to the women's movement."

The women all have stories to tell about strange and sometimes rude reactions from crew members, passengers, and the public. A few people see a woman pilot sitting in the cockpit and refuse to fly, choosing to wait for the next flight with a "real" pilot or

asking for a refund. But the funny comments and reactions are what these women remember most. Many passengers mistake women Captains for flight attendants, asking them for beverages or a magazine. Captain Lori Griffith, hired by Piedmont Airlines in 1984, has had several funny experiences on the job. Once an elderly lady who she had helped to a seat before the plane departed commented that it was nice of the Captain to let her sit up front with him, having seen Griffith sitting in the cockpit during the flight. "Once a woman ran to the galley as we were taxiing out to the runway to ask the flight attendant why we were taxiing when it was obvious that the pilots were left at the gate," said Griffith. "We had an all female crew and I'm not sure just what she thought we were doing up there." Kathy Sullivan, who flies Boeing 737's, was surprised one time when she and her all-female crew got a standing ovation from the passengers. Once, Captain Amy Correll (who was a flight engineer on a 727 at the time) was surprised when a man boarding the plane asked the captain about Correll's qualifications. "The captain calmly replied I had a Ph.D. in Astrophysics from MIT," Correll said. "I struggled to keep a straight face while the man took his seat."

CONCLUSION

So will there be future changes "in the air"? You bet! The percentage of women pilots continues to increase, and by the year 2000, it is predicted that the number of women airline pilots will more than double in size to approximately 15% of total airline pilots. As women become more commonplace in cockpits, negative or surprised reactions towards them will also decrease. More "firsts" will surely be set by women in all walks of aviation and new frontiers will be explored with women in the forefront. Women have permeated every aviation field, and they are there to stay.

Amelia Earhart would be proud.

Author's Note: Special thanks to the Potomac Chapter (MD) of the Ninety-Nines for the help and encouragement given me on this article and towards getting my pilot's license, especially Patricia Garner, Evie Washington, Nancy Waylett, Mary Feik, and Linda Denett. Thanks also to Velta Benn, Jean Ross Howard, Pat Napier Adams, and JoEllen Casilio for their time and input. Also I would like to acknowledge Henry M. Holden's book, *Ladybirds, for much of my background information.*

Ms. Kjos was a U.S. Department of Transportation Management Intern when she prepared this article as part of a developmental assignment on the Aviation News Staff. She is a student pilot and now works in FAA's Office of Contracting and Quality Assurance. ***—Editor***

PROFILE: Nancy Waylett—ATP, CPI

Flying is the only way of life for Captain Nancy Waylett. She has been a pilot with USAir for 10 years and was promoted to Captain three years ago. Determined to succeed in aviation, Nancy completed her instrument, commercial, certificated flight instructor (CFI), certificated flight instructor instrument (CFII), multi-engine, and multi-engine instructor ratings all in a six-month period. She passed the checkrides for all of these ratings within a two month period and began instructing. "I taught everybody," described Nancy. "I got to be an expert at teaching 'hard knocks' cases, the cases nobody else could teach."

Soon after she began instructing, Nancy was hired by Milestone Petroleum as a corporate jet Captain. Then in 1983, she began with USAir as a Flight Engineer on Boeing 727's. It took only three months for Nancy to again move up the cockpit ladder to First Officer, a position she held for six and a half years. As a Captain now, Nancy is on reserve to fly Boeing 737's. The reserve schedule, for newly promoted Captains, involves being on-call to cover any additional or unexpected flights. A regular monthly schedule is approved for Captains after they have gained seniority during their initial years. Although the hectic schedule is sometimes difficult, Nancy believes the inconveniences are definitely worth the challenge and enjoyment that aviation and her career provide.

So what is Nancy's secret to becoming a successful airline pilot? "I had a very good basic instructor," she says. "I think that's the key to anyone learning how to fly. His philosophy was 'the way you fly the Cessna 150 is the way you'll fly a Boeing 747.' And he was right. If the basic skill, attitude, judgement, and thinking are there, that's the way you'll always fly."

Nancy encourages other women to fly professionally. Overall, she has been well accepted during her years as a woman pilot. Her favorite comment comes from "the 90-year-old woman," says Nancy, "who comes up and pats my hand and says, 'Dearie, I'm just so glad to see you up here.'"

Question: *I really enjoy your magazine. However, please explain Class F airspace. I frequently fly to Canada, to the Bahamas, and to the Cayman Islands and I want to be in full compliance. No one at the FSDO level knows what "Class F" airspace is, and they keep giving me a FAA Aviation News reprint, "The ABC's of Airspace Reclassification," which does not address this issue.*

Answer: In International Civil Aviation Organization (ICAO) Class F airspace, air traffic control provides separation service to IFR aircraft so far as practical. As there is no equivalent in U.S. airspace, the FAA decided not to adopt Class F.

As for being in compliance, FAR § 91.703 requires that each person shall operate a civil aircraft of U.S. registry outside the U.S. in compliance with the regulations relating to the flight and aircraft operations in force within that country. Also, each person is expected to comply with FAR Part 91 if it does not conflict with the applicable regulations of that foreign country.

• Cross-country Requirements

FAR §§ 61.109(b)(2) and 61.129(b)(3)(ii) describe the aeronautical cross-country experience requirements for Private and Commercial (Airplane) Pilot certification. If all of the other cross-country requirements are met, and the applicant has exactly the minimum hours of cross-country experience required for the airplane rating, my questions are:

1. *Do the applicants for these ratings meet the FAR requirements if within the cross-flight there is a landing between points less than 50 nautical miles (NM) apart?*
2. *Do the applicants for these ratings meet the FAR requirements if on the return to the original departure point, they make a stop at a point that is less than 50 nautical miles from the original departure point?*

Thomas E. Miller
Ballston Spa, NY

The answer to both questions is yes, provided that the distances flown meet all of the stated FAR requirements and that at some point during each cross-country flight a landing is made at a point that is more than 50 nautical miles from the original departure point.

• Request for Change

I have been subscribing to FAA Aviation News for a few years and applaud the Administrator for the magazine. As a flight instructor working on my instrument flight instructor certificate, I would like to inquire if the FAA could change the illustration of "eights along a road" in the FAA's Flight Training Handbook (FTH) (AC 61–21A) to show the longest dimension of the eight over and along the road. Naturally, the "eights across a road" would also have to be changed.

Also, I would suggest changing FAR § 135.243 (Pilot in command qualifications) to allow newly licensed commercial pilots to fly as pilot in command in any airplane that does not require a type rating. Such a change would enable new and low-time pilots to enhance their flying careers by building flight time much more rapidly.

W.R. Nofford
Port Charlotte, FL

Thanks for the opportunity to tell you and our other readers how to comment on the various handbooks published by the FAA. Currently, the FAA is soliciting comments on four airman handbooks it plans on updating and republishing. Your suggestion about changing the illustration for "eights along a road" has been forwarded to the FAA office in Oklahoma City responsible for updating the handbooks. Your comments will be considered along with those of others in the aviation industry during the handbook updating process.

In addition to the Flight Training Handbook (AC 61–21A), the Pilot's Handbook of Aeronautical Knowledge (AC 61–23B), the Instrument Flying Handbook (AC 61–27C), and the Basic Helicopter Handbook (AC 61–13B) are being reviewed. Anyone wanting to submit comments about the handbooks or proposed changes to the handbooks should send their comments to FAA Operations Standards Development Section, AVN–131, P.O. Box 25082, Oklahoma City, OK 73125.

Regarding your second question, although many new, commercial pilots would probably welcome any change in FAR § 135.243 that would give them the chance to build flight time more quickly, the purpose of the FAR is to protect the flying and general public. The FAR does this by setting the minimum standards for PIC's engaged in air taxi and commercial operations that are necessary to ensure public safety. As you know, this particular FAR is only one of many that hold airmen engaged in air taxi and commercial operations to much higher standards and operating limitations than pilots operating under FAR Part 91. But new pilots should not be discouraged. Thousands of pilots have found the means over the years to build the flight time needed to meet the various higher commercial operating requirements such as those in this FAR. Please remember, one of the FAA's most important public obligations is ensuring that when the flying public puts their lives in the hands of the unknown airmen flying their aircraft, the pilot in command and crew have the necessary skill and experience to ensure a safe flight.

FAA AVIATION NEWS welcomes comments from its readers. We may edit letters for style and/or length. We will select one representative letter from those on the same topic for publications, and because of our bimonthly publishing schedule, responses may not appear for several issues. We will send personal replies only upon request. We will not print anonymous letters, but we will withhold names upon request. Address: Editor, FAA AVIATION NEWS, AFS–810, Washington, DC 20591.

• Established by ICAO and PTS

I have subscribed to FAA Aviation News for several years. It is a very interesting magazine. I particularly like the "FlightForum/Instrument Corner." I would like to comment about the "An Established Meaning" article in the May/June 1992 issue. The International Civil Aviation Organization (ICAO) publishes a document on flight procedures (Doc. 8768 Vol.I) which states in Chapter 3,3.3.3.4 that when discussing approach segments, "Established" is considered as being within half full scale deflection for the ILS and VOR, or within +/-5 degrees of the required bearing for the NDB.

Henrique Nunes
ANA-EP Air Traffic Controller
Santa Maria Area Control Centre
Portugal

Thank you for providing us with ICAO's international definition for determining when one is established on an approach segment. Such a definition makes it easy to determine if one is established on course or not. For those pilots not familiar with ICAO, it is the world's civil aviation organization which sets the international aviation standards for all member states. The United States, as an ICAO member state, complies with ICAO procedures and polices.

In addition to the ICAO definition and our discussion in the May-June 1992 issue of the magazine on how to determine when you are established on course, there is an indirect method we have not discussed. The FAA's Practical Test Standards (PTS)

for the various pilot certificates or ratings set the minimum acceptable pilot performance standards for the various tests. The Instrument Rating, and the Airline Transport Pilot (ATP) and Type Rating PTS each include instrument performance standards as part of their respective tests. Since the PTS set the minimum acceptable pilot performance standards for a given certificate or rating, by inference, the PTS must indirectly set the minimum instrument flying standards within the U.S. (The FAR set all flight standards, including being the basis for the PTS within the U.S.) Therefore, if you are navigating within the respective PTS tolerances for your certificate or rating on a specified IFR route segment, you must be established on course.

The PTS instrument standards are as follows. An Instrument Rating applicant is not permitted more than three-quarter-scale CDI or glide slope deflection during a VOR or ILS approach and no more than plus or minus 10 degrees deviation for an NDB approach. ATP or Type Rating applicants are allowed no more than one-quarter scale CDI or glide slope deflection during an ILS approach, less than half-scale CDI deflection for VOR approaches, and plus or minus 5 degrees for NDB approaches. So, although FAR Part 1 does not define the term "established," an instrument or ATP pilot flying IFR within his or her appropriate Practical Test Standards must be "established" on course when operating on an IFR route segment within those standards.

• What's Official

On the inside of the front cover, you make the following statement, "The magazine promotes safety in the air by calling the attention of airmen to current technical, regulatory, and procedural matters affecting the safe operation of aircraft. All printed materials herein are advisory or informational in nature and should not be construed as having regulatory effect." Does the above statement mean that the FAA Aviation News *provides the aviation community with the FAA's Official interpretation of technical, regulatory, and procedural matters? Am I, as an instructor to teach your interpretations and as a Designated Pilot Examiner to accept these interpretations as "Official?"*

Joe D. Parker
Vero Beach, FL

The material published in the magazine is only advisory or informational in nature and should not be construed as having regulatory effect, even though the magazine's articles are approved by the various policy-making organizations here at FAA Headquarters for compliance with current policy and guidelines. The magazine allows us to provide our readers an informal forum to ask questions about various FAA rules and policies without having to go through a typical, "official," bureaucratic process.

Regarding your question about the magazine being an official source, the FAA prints many "official" sources of information, such as the *Airman's Information Manual* (AIM), various training handbooks, and advisory circulars that are all non-regulatory in nature. They provide the public the FAA's officially recognized procedures or means for complying with its various regulatory requirements. As one such publication, the *FAA Aviation News* is Flight Standards Service's "official" safety magazine. That is as "official" as we can get. Although the information contained in FAA Aviation News conforms to the FAR and FAA policy, as an instructor and Pilot Examiner, your official regulatory guidance is contained in the Practical Test Standards (PTS), the FAR, your examiner's manual, and any other regulatory guidance you may receive.

• Visibility Defined

FAR § 91.175(c)(2) states that operation below decision height (DH) or minimum descent altitude (MDA) is only permitted if flight visibility is not less than the visibility prescribed in the approach being used. However, the visibility prescribed in the instrument approach procedure (IAP) either prevailing or runway visual range (RVR) is ground visibility. Is the value for ground visibility presumed to reflect the flight visibility? If not, can a pilot legally land the aircraft if he/she believes the flight visibility exceeds the prescribed ground visibility, even if the prescribed ground visibility, prevailing or RVR, is being reported as being below minimums?

Cyril Toker
Ponte Vedra Beach, FL

Reported ground visibility has no reflection on actual flight visibility. FAR Part 1 defines both flight and ground visibility, and there is a difference in the two meanings. Flight visibility means the average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night. Ground visibility means prevailing horizontal visibility near the earth's surface as reported by the U.S. National Weather Service or an accredited observer. As you can see, no pun intended, flight visibility is the slant range visibility from the cockpit. In flight, flight visibility may be greater than ground visibility. But landing minimums are based upon ground visibility for a good reason. Many times it is possible when flying for the pilot to look down through a fog bank over an airport and see the ground, but when that pilot tries to land, the pilot can not see far enough down the runway through the fog to maintain directional control. This inability to see through a surface obscuration at ground level is the reason why FAR §91.175(d) states, "No pilot operating an aircraft, except a military aircraft of the United States, may land that aircraft when the flight visibility is less than the visibility prescribed in the standard instrument approach procedure being used." Also FAR Parts 121 and 135 specifically restrict operations if the visibility is below published minimums. Pilots landing in reported conditions less than that prescribed for the IAP being used may be investigated for non-compliance with the FAR.

• Supervising Simulator Time

Please answer a question that has caused some serious concern. FAR § 61.57(e)(1) states that a pilot may log up to three hours in an approved simulator to meet currency requirements. There is no mention of these hours having to be supervised by a CFI. Recently, a couple of trade magazines stated that CFI supervision is required. Realizing that Advisory Circulars (AC's) are non-regulatory, AC–61–98A, Para. 6a, states that the hours "may be done under the supervision. . . ." The statement begs the question as to whether the pilot may (author's emphasis) elect to use a simulator versus whether if he uses a simulator that a CFI may (author's emphasis) be used to supervise.

Name withheld by request

FAR § 61.51(c)(5) which deals with the logging of pilot ground trainer instruction is the basis for answering your question. All time logged in a ground trainer used to meet pilot currency, instruction, or skill requirements must be certified by an appropriately rated instructor from whom it was received. In the case of an approved instrument training device or simulator being used to meet IFR currency requirements, the IFR training must be signed off by an instrument flight instructor or ground instructor with instrument privileges. A similar question was answered in the May-June 1992 issue of the magazine.

I Wish I Hadn't Said That

The following is a selection of remarks made by pilots, controllers and others where it is clear that they had not engaged their brains before opening their mouths. Our thanks to the Editor and Staff of the U.K.'s *General Aviation Safety Information Leaflet* (GASIL) for sharing their particular favorites.

Pilot: "Golf Juliet Whisky requests instructions for takeoff."

Persons unknown: "Open the throttle smoothly, check temperatures and pressures rising, keep the aircraft straight using. . . "

Student Pilot (trying to disguise the fact that he is lost) to an airport which is presently overhead: "Unknown airport with Cessna 150 circling overhead, identify yourself."

Tower: "Alpha Charlie climb to and maintain 4,000 feet for noise abatement."

Aircraft: "Tell me how at 2,000 feet I can possibly be creating undue noise."

Tower: "At 4,000 feet you will miss the twin coming at you at 2,000 feet and that is bound to avoid one hell of a racket."

And finally, the GASIL Editor's favorite, involves a twin engine aircraft with fare-paying passengers on board which had a serious engine fire in flight. Even more unfortunately, the captain of the aircraft, realizing he had to inform both the airport of the hazard and the passengers of their impending diversion, regrettably operated the transmit/intercom switch the wrong way. While Air Traffic might have been mildly amused to be told, "Hello everybody, we're just going to make a landing at a nearby airport so you can all have a nice cup of tea," the amusement was not shared by the passengers, who were told over the intercom "Mayday, Mayday, Mayday, Golf Xray Xray engine fire. Emergency landing. Please have all emergency services including fire and ambulances available."

Replacing Lost or Destroyed Certificates

Airmen who need to replace their lost or destroyed certificates can no longer use the Western Union collect telegraphic service to obtain a telegram from the FAA confirming their status as holders of specified certificates and ratings. The Airmen Certification Branch and Aeromedical Division will now FAX you the required information to enable you to keep flying. For more information on this subject, contact the Airman Certification Branch, AVN–460 (telephone: 405–680–3205) or Aeromedical Certification Branch, AAM–300 (telephone: 405–680–4821) at P.O. Box 25082, Oklahoma City, OK 73125.

National Designated Pilot Examiner Registry

The Federal Aviation Administration (FAA) and the Experimental Aircraft Association (EAA) recently signed an agreement to initiate a National Designated Pilot Examiner Registry (NDPER) of pilot examiners authorized to check out pilots in certain large vintage, surplus military aircraft hereafter called vintage aircraft. This NDPER program will allow registry pilot examiners to check out applicants in the vintage aircraft for which the FAA may not have enough qualified inspectors to conduct either initial certification or proficiency tests required by the FAR for their operation.

Under the NDPER program, EAA will identify and recommend to the FAA pilots believed qualified in specific types of large, reciprocating engine, single and multi-engine vintage aircraft such as T28's, B17's, B25's, and P38's. The EAA will maintain a list of all of registry examiners approved by FAA and the aircraft make, model, and type, or series in which each registry examiner is authorized to give practical tests. EAA will also maintain a record of each registry examiner's FAA designation and initial and recurrent training given to ensure that registry examiners maintain currency in the aircraft in which they are authorized to give practical tests. As part of the FAA/EAA agreement, EAA will develop and oversee a training program found acceptable to the FAA for each registry examiner in vintage aircraft in which the examiner is authorized to conduct practical tests under the NDPER program.

A record of each practical test given by registry examiners will also be maintained by EAA along with the test results. Each record will include pilot data as well as the type of aircraft in which the practical test was conducted. EAA will also keep a current list of aircraft identified as vintage aircraft under the NDPER program.

Under this program, applicants will be able to contact either their local Flight Standards District Office (FSDO) or the EAA for the names of registry pilot examiners qualified in a particular vintage aircraft. Applicants can then contact a registry examiner of their choice to arrange the practical test needed without regard to FSDO or regional boundaries. The local FSDO will coordinate the required FAA flight test between the involved FSDO's and regions if the test is to be given outside of the local FSDO's area. The FAA may, at its discretion, elect not to observe the flight test when conducted.

Although the NDPER program will be facilitated by EAA, the FAA will monitor the program for compliance with appropriate FAR and FAA pilot examiner policy regarding airman certification and registry examiners activities. Working together, this cooperative program between EAA and FAA should ensure that the needs of all qualified airmen who wish to fly vintage aircraft are met. As the letter of agreement states, this is a model FAA/EAA partnership program designed to provide a service to the public by ensuring the continued preservation and static and flight display of a broad variety of ex-military vintage aircraft that might otherwise be lost to public view.

Updates on this subject will appear in a variety of FAA publications.

Improper Aircraft Exporting Procedures

Recently representatives from the Brazilian Civil Airworthiness Authority (CAA) visited FAA headquarters to discuss operation of aircraft bearing U.S. registration in Brazil. They brought along a list of 104 N-numbered aircraft currently operating in Brazil, some for as long as two years.

What's so unusual about that, you say? When FAA Maintenance Division ran the 104 N-numbers through the Aircraft Registration Branch in Oklahoma City, they found out that 48 of the aircraft had been previously deregistered, sold, and exported. Although these aircraft had been removed from U.S. registry, their owners had not assured that the U.S. registration numbers were removed as required by FAR § 45.33.

The FAA has received similar inquiries and reports from CAA's in the United Kingdom and many other countries. These countries have expressed concern about the increasing number of aircraft bearing U.S. markings operating in their airspace. Most member countries of the International Civil Aviation Organization (ICAO) do not, as a normal procedure, spot inspect or ramp check foreign-registered aircraft operating in their countries. They expect the country of registry to ensure proper registration and airworthiness.

Owners and operators of U.S.-registered aircraft must be aware of the regulatory requirements. At the time of official sale to a non-U.S. purchaser, FAR § 45.33 requires the registration certificate holder to remove permanently all U.S. registration marks from the aircraft. FAR § 47.41 requires that the Certificate of Aircraft Registration, AC Form 8050–3, be returned to the FAA Aircraft Registry with its reverse side completed. The address is:

FAA Aircraft Registration Branch
AVN–450
P. O. Box 25504
Oklahoma City, OK 73125

Previous owners of the aircraft involved in the Brazil incident included aircraft dealers, private individuals, and new aircraft manufacturers. Being aware of the regulatory requirements for deregistering aircraft and following the proper procedures will help aircraft owners and exporters to avoid confrontations with the FAA, U.S. Customs Service, the Drug Enforcement Agency, and other federal entities.

Prepared by Larry Kephart, Manager, FAA's General Aviation and Commercial Branch, Aircraft Maintenance Division.

Carrying You Back To Ol' Virginny

Going to Sun 'n Fun for a few days this April? Well, if you are, you might want to head home through the Commonwealth of Virginia. Why? To get your Wings, of course!

As a part of Virginia's annual Aviation Safety Week, there will be a Virginia "Wings Weekend" at Manassas Municipal Airport (HEF) on April 24 and 25. Manassas is located in a beautiful and historic part of Virginia not far from Washington, DC. It's about 14 miles south of Dulle International Airport and is the site of the country's only recycled control tower.

What is a "Wings Weekend?" A chance to participate in the Accident Prevention Program's Pilot Proficiency Awards Program and qualify for your "Wings" lapel pin all in one weekend. Continuous safety seminars will be going on hourly, and the ground and flight instruction will be provided at no charge. You can finish the requirements (one hour of airwork, one hour of takeoffs and landings, and one hour of instrument flight plus attendance at a seminar) in one day or do it more leisurely in two days. In addition to the seminars and flying aircraft, there will be aircraft on display, good food, and some interesting hangar talk. When you have completed your requirements, you'll receive your certificate and Wings on the spot. Remember, the Wings count as a biennial flight review.

You must pre-register to assure that you will be accommodated by the Capitol Area Association of Flight Instructors, who are volunteering their time for the weekend. For specific flying and driving arrival procedures and information on motels, contact Accident Prevention Program Manager Jim Jacobsen at (703) 661–8160.

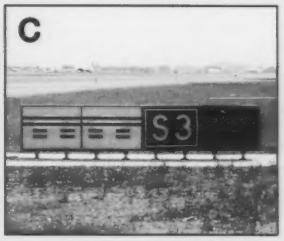
Checked Your Plumbing Recently?

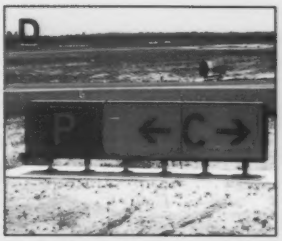
No, we are not talking about your bathroom at home. We are talking about the plumbing in your airplane. What? You say your trusty four place aeroplane doesn't have plumbing. It doesn't even have enough space for a portapottie. No, we have not flushed one too many times. We are talking about a method for some aircraft owners to check their aircraft's fuel system. A recent recommendation from the FAA's General Aviation and Commercial Branch, Aircraft Maintenance Division points out how pilots and mechanics can check their fuel system for leaks with a simple prestart test.

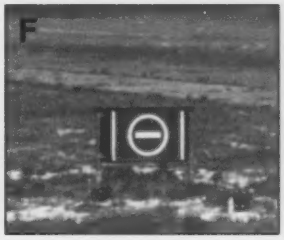
Depending upon type of aircraft (not all aircraft have the required fuel pumps and gauges) the fuel pressure check is done before engine start to avoid the possibility of an engine fire. This check is especially important after maintenance where the fuel system plumbing was disturbed or when braided hoses are moved or disturbed. (Please note, before conducting this type of check, pilots and mechanics must review the aircraft operating handbook/service manual to make sure there are no restrictions on doing this type of check. Appropriate safety procedures must always be followed when doing any kind of check.) The technique is to turn the magnetos off, master switch on, fuel boost pump on, place the throttle and mixture control full forward, and monitor the fuel pressure and flow. If the pressure is lower than what is indicated in the POH or aircraft manual as normal and the flow is above zero with the engine static, there is a good chance there is a leak in the system. If a leak is suspected, it should be checked out by an appropriately rated mechanic before engine start.

One way to avoid possible leaks in any plumbing system is to replace at recommended intervals any metal braided medium pressure hose that is subject to constant engine heat or flexing. The problem is the metal braid may hide small cracks or deterioration in the hose that may go unnoticed during a preflight check. Such defects could cause leaks. According to the recommendation, a good hose replacement would be one that meets the specifications of MIL H 8794 with a fire sleeve in areas where needed, but always remember the manufacturer's recommendations must be followed when replacing any aircraft item. Have a safe flight.

TEST YOUR piloting IQ: Signage Quiz







by Louise Oertly, *Associate Editor*

Now that you have read the article, "Aviation Sign Language," on pages 4 and 5, test yourself to see if you can read the following airport signs. Admittedly, not all airports will not be required to use these signs, but you should be familiar with them just in case you come across them in your travels.
(The answers are on page 14.)

___1. Holding position line for ILS critical area

___2. Do not enter sign to indicate areas that aircraft are prohibited from entering

___3. Taxiway location sign collocated with taxiway direction sign for single crossing taxiway

___4. Outbound destination sign showing the same direction for two runways (Note: black dot should be read as "and")

___5. Inbound destination sign showing direction to apron

___6. Taxiway location sign collocated with boundary sign for runway safety area/obstacle free zone sign

___7. Holding position sign for taxiway located in approach area for a runway

___8. Location sign collocated with runway holding position sign

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